

Megalastrum (Dryopteridaceae) in Andean South America, Part I

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ABSTRACT.—We recognize 46 species of *Megalastrum* in the Andean region of South America. This is the highest diversity of any region for the genus. Of these species, 38(83%) are endemic to the region. Keys, descriptions, illustrations, distribution maps, nomenclatural information, specimens examined, index to collectors' names, and number are provided. Nineteen new species are described: *M. clathratum*, *M. decompositum*, *M. fimbriatum*, *M. fugaceum*, *M. galapagense*, *M. insigne*, *M. miscellum*, *M. nanum*, *M. nigromarginatum*, *M. obtusum*, *M. oellgaardii*, *M. oreophilum*, *M. peruvianum*, *M. polybotryoides*, *M. praetermissum*, *M. pubirhachis*, *M. rhachisquamatum*, *M. subtile*, and *M. tepuiense*. A new combination is made for *M. fibrillosum*, and lectotypes are designated for *Aspidium araguata*, *Dryopteris villosula*, *D. villosula* var. *inaequalis*, *D. wolfii*, *D. subincisa* var. *bogotensis*, *Megalastrum acrosorum*, *M. mollicoma*, *M. squamosissimum*, and *Nephrodium subglabrum*. The elevation range for the genus is 250–3500 m, with most species occurring at middle elevations from roughly 800–2000 m. Only four species occur in the Tepui region of southern Venezuela and northern Brazil: *M. biseriale*, *M. crenulans*, *M. oreophilum*, and *M. tepuiense* (endemic).

KEY WORDS.—diversity, ferns, taxonomy, new species.

RESUMEN.—Reconocimos 46 especies de *Megalastrum* en la región Andina del América del Sur. Esto es la diversidad más alta de cualquier región del género. De estas especies, 38(83%) son endémicas a la región. Se suministran claves, descripciones, ilustraciones, mapas de distribución, datos nomenclaturales, ejemplares examinados, índice a los nombres y números de los colectores. Diez y nueve especies nuevas son descritas: *M. clathratum*, *M. decompositum*, *M. fimbriatum*, *M. fugaceum*, *M. galapagense*, *M. insigne*, *M. miscellum*, *M. nanum*, *M. nigromarginatum*, *M. obtusum*, *M. oellgaardii*, *M. oreophilum*, *M. peruvianum*, *M. polybotryoides*, *M. praetermissum*, *M. pubirhachis*, *M. rhachisquamatum*, *M. subtile*, and *M. tepuiense*. Una combinación nueva se hace para *M. fibrillosum*, y se designan lectotipos para *Aspidium araguata*, *Dryopteris villosula*, *D. villosula* var. *inaequalis*, *D. wolfii*, *D. subincisa* var. *bogotensis*, *Megalastrum acrosorum*, *M. mollicoma*, *M. squamosissimum* y *Nephrodium subglabrum*. El rango elevacional para el género es 250–3500 m, con la mayoría de especies encontrándose desde 800–2000 m. Solamente cuatro especies existen en la región de los Tepuis en el sur de Venezuela y el norte de Brasil: *M. biseriale*, *M. crenulans*, *M. oreophilum* y *M. tepuiense* (endémica).

This work represents the sixth and last in a series of papers dealing with the worldwide diversity and taxonomy of *Megalastrum* Holttum. The first dealt with the 18 species occurring in Brazil, Paraguay, and Uruguay (Moran *et al.* 2009a); the second with seven species in the West Indies (Moran *et al.* 2009b);

the third with 21 species in Central America (Moran and Prado 2010); the fourth with the seven species in circumaustral regions in Chile, Argentina, and southern islands of the Atlantic, Pacific, and Indian Oceans (Sundue *et al.* 2010); and the fifth with three in the African-Madagascan region (Rouhan and Moran 2011). The total number of species recognized in these previous works is 53. Accounting for species that occur in two or more regions, the number of species in these previous papers plus the 46 species recognized herein for the Andes, result in a total of 91 for the genus worldwide.

Megalastrum is a member of Eupolypods I (Schuettpelz and Pryer 2007), a clade characterized by petioles containing several vascular bundles with the two adaxial ones enlarged (pers. obs. of the authors). Within the Eupolypods I, the genus belongs to the Dryopteridaceae (Christenhusz *et al.* 2011; Smith *et al.* 2006, 2008), a family for which there are no known morphological synapomorphies (pers. obs. of the authors). Within Eupolypods I, the genus can almost always be distinguished by a character of its venation: in the proximal portions of the pinna, the veinlet that supplies the basal basispic lobe or segment of a pinnule springs from the costule; however, distally along the pinna rachis, the segments or lobes become successively more adnate and decurrent on the pinna rachis, and the veinlet supplying the lobe or segment springs from the pinna rachis, not the costule (Christensen 1920, Holttum 1986, Smith and Moran 1987). In other words, the veinlet "migrates" from the costule onto the pinna rachis as one moves distally along the pinna. Among other Dryopteridaceae this character occurs only in a few species of *Ctenitis* (C. Chr.) C. Chr. and *Stigmatopteris* C. Chr. Other characters found in nearly all species of *Megalastrum* are erect or decumbent rhizomes, basal pinnae prolonged on the basispic side, pinna rachises and costules adaxially pubescent, and vein tips enlarged (hydathodous). Most species of *Megalastrum* are non-indusiate or have a minute, hair like, and fugacious indusium; in the Andean countries, only four species have a well-developed circular indusium (*M. acrosorum*, *M. andicola*, *M. crenulans*, and *M. insigne*). All species of the genus grow terrestrially, or rarely on rocks, in wet shaded forests. A more detailed treatment of the characters and taxonomic history of the genus can be found in Moran and Smith (2004) and the papers cited in the above paragraph.

Within the Dryopteridaceae, *Megalastrum* is sister to *Rumohra* Raddi, and the two genera are in turn sister to a paraphyletic *Lastreopsis* (Schuettpelz and Pryer 2007; Labiak *et al.*, 2014). These related genera are readily distinguished from *Megalastrum*. Both differ from *Megalastrum* by creeping rhizomes, green lamina margins thickened and decurrent onto the axis of the next lowest order. *Rumohra* further differs by dorsiventral rhizomes with an elongated ventral meristele (as seen in cross section), leaf axes glabrous adaxially, and peltate indusia (Kato 1974). *Lastreopsis* further differs by colored glands on the sporangial stalks (Tindale 1965).

What follows is a taxonomic treatment of *Megalastrum* in the Andean countries of Venezuela, Colombia, Ecuador, Peru, Bolivia, and Argentina (the species in Chile were treated by Sundue *et al.*, 2010). More species of *Megalastrum* occur in these countries than in any other area. About 83% of the

species are endemic to the region, and about 40% are described as new. Further collecting in the Andes will almost certainly uncover more new species.

MATERIALS AND METHODS

This treatment is based on a study of about 800 gatherings from 27 herbaria (see Acknowledgments). Species recognition was based on morphological characters such as scales, hairs, glands, lamina dissection, and perispore. We have illustrated these characters with silhouettes for lamina dissection and line drawings for details of the indument.

Spore images of nearly all species were taken with a Scanning Electron microscope at the Pfizer Lab at the New York Botanical Garden. The spores were transferred with dissecting needles from herbarium specimens to aluminum SEM stubs and coated with an asphalt adhesive. The stubs were then coated with gold-platinum in a sputter-coater for 2.5 min, and spores were imaged digitally using a JEOL JSM-5410LV SEM equipped with a JEOL Orion 5410 software interface. The accelerating voltage was 15 kV. All images were adjusted for contrast, provided with a black background, and uploaded to a public website: <http://www.plantsystematics.org/>

Notes on format.—In the nomenclature section for the species, we cite barcode numbers or, if these are absent, accession numbers. For some herbaria (e.g., AAU, GOET, MICH) both numbers were absent, and therefore are not cited.

In the Selected Specimens Examined, only one or two specimens per Department or Province are listed. We tried to select those specimens that were most widely distributed in herbaria. When geographic coordinates are given in brackets, it means that we located this information on-line because the coordinates were not given on the specimen label. All specimens examined, which include those not cited in the Selected Specimens Examined section, are listed in the Index to Collectors' Names and Numbers (Appendix III). The dot-distribution maps are based on all the specimens studied for a given species. In the figures with line drawings depicting indument characters, the letter "I" has been omitted to avoid confusion with it representing a small scale bar.

RESULTS

Species diversity.—We recognize 46 species of *Megalastrum* in the Andean countries of South America. Of these species, 38(83%) are endemic to that region. This is the highest diversity of species for any region in the genus. Ecuador has the highest *Megalastrum* species diversity and endemism of any country (Appendix 4; 30 species, 7 endemics). Only four species occur in the Tepui region of southern Venezuela and northern Brazil: *M. biseriale*, *M. crenulans*, *M. oreophilum*, and *M. tepuiense* (endemic). Two species are endemic to the Galapagos Islands: *M. galapagense* and *M. pleiosoros*. Within the

Andean region, the species are distributed from northern Venezuela to northern Argentina (Fig. 1). The genus is conspicuously absent from Amazonia.

The Andes have been a barrier to species ranges, with restriction of certain species of ferns to either the eastern or western sides (Moran 1995, 1996). The following four species occur only on the western side: *M. ctenitoides*, *M. decompositum*, *M. obtusum*, and *M. reductum*. In contrast, the following nine occur only on the eastern side: *M. bolivianum*, *M. falcatum*, *M. fibrillosum*, *M. hirsutosetosum*, *M. molle*, *M. polybotryoides*, *M. praetermissum*, *M. pubirhachis*, and *M. subtile*.

Ecology.—All species of *Megalastrum* occur terrestrially on the floors of wet, shaded forests. Occasionally, a species may be found on rocks or boulders, but all species are primarily of forest floors. The elevation range for the genus is 250–3500 m, with most species occurring at middle elevations from roughly 800–2000 m.

Spores.—Our SEM images of the spores of nearly all Andean species of *Megalastrum* can be viewed on-line at www.plantsystematics.org. The spores of the Andean species fall neatly into two groups. The first group consists of a clade (unpublished molecular results; in prep.) defined by cristate spores with parallel ridges (Fig. 2A–C). This character defines a large clade that occurs only in the Andes, Central America, and the West Indies. This clade is nested with the second group (unpublished molecular results; in prep.), which consists of those species with echinulate spores (Fig. 2D–F). The species in this group are *M. crenulans* and seven species belonging to a clade informally called the “pulverulentum group” (unpublished molecular results; in prep.). Those seven species are *M. adenopteris*, *M. clathratum*, *M. fugaceum*, *M. nanum*, *M. oellgaardii*, *M. pulverulentum*, and *M. sparsipilosum* R. C. Moran & Prado (this last species occurs only in Central America; Moran & Prado 2010).

TAXONOMIC TREATMENT

Megalastrum Holttum, Gard. Bull. Singapore 39: 161. 1986. TYPE: *Megalastrum villosum* (L.) Holttum. [= *Polypodium villosum* L.]

Dryopteris subg. *Ctenitis* C. Chr. “restricted to the species group of *D. subincisa* C. Chr.,” Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd. ser. 8, 6: 32, 59. 1919 [1920].

Dryopteris sect. *Subincisae* C. Chr., Index Filic., Suppl. 3: 7. 1934. *Ctenitis* C. Chr. sect. *Subincisae* (C. Chr.) Tindale, Contr. New South Wales Natl. Herb. 3: 252. 1965. TYPE: *Dryopteris subincisa* (Willd.) Urb., 1903. [= *Polypodium subincisum* Willd., 1810]

Plants terrestrial; *rhizomes* erect to decumbent; petioles scaly toward the base, with 4–10 vascular bundles, the two adaxial bundles enlarged; *laminae* 1-pinnate-pinnatifid ranging to 4-pinnate-pinnatifid, catadromic above the basal pinnae; basal pinnae inequilateral and enlarged on the basiscopic side or (less commonly) equilateral; *rachises*, *pinna rachises*, and *costules* not

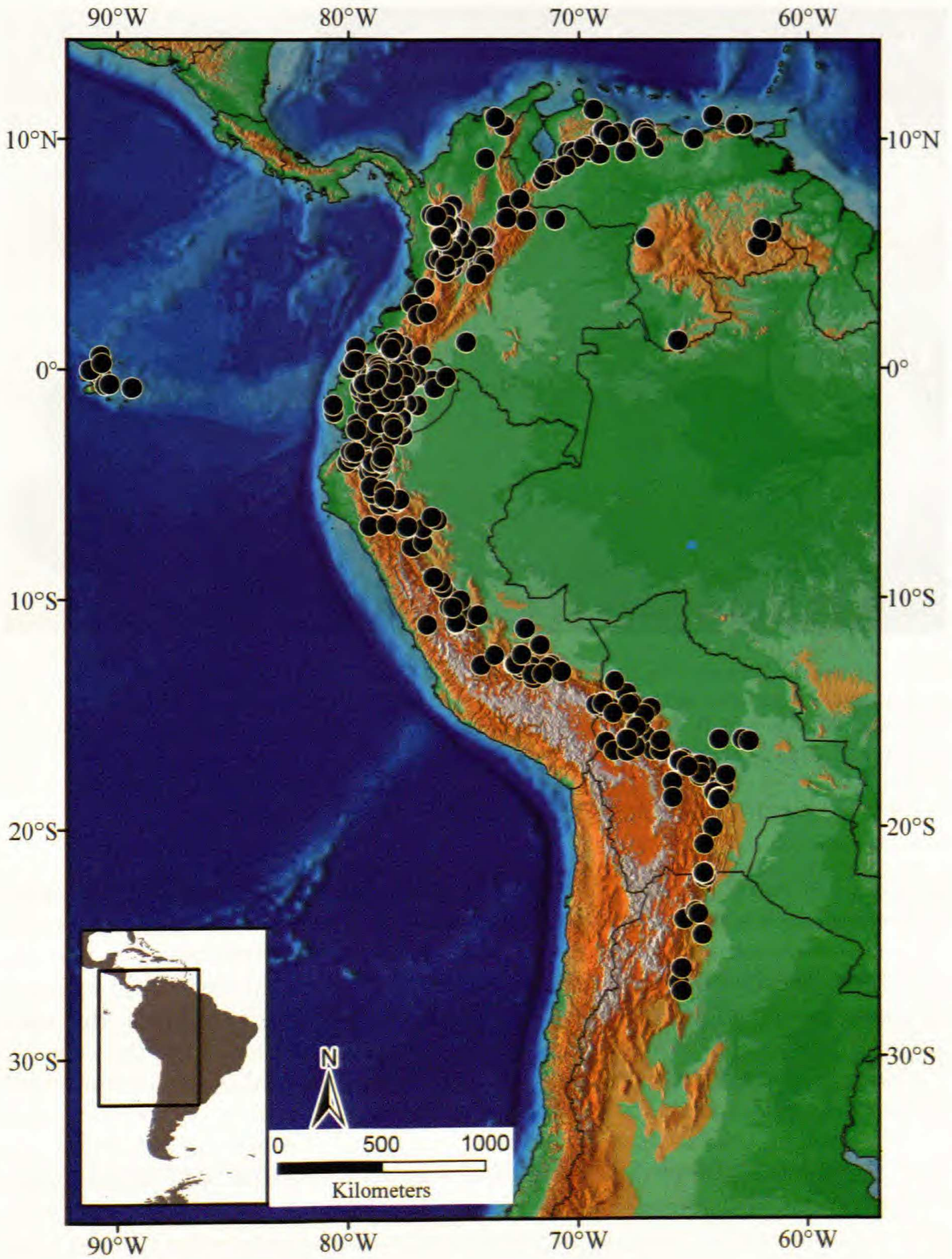


FIG. 1. Distribution of *Megalastrum* in the Andean countries.

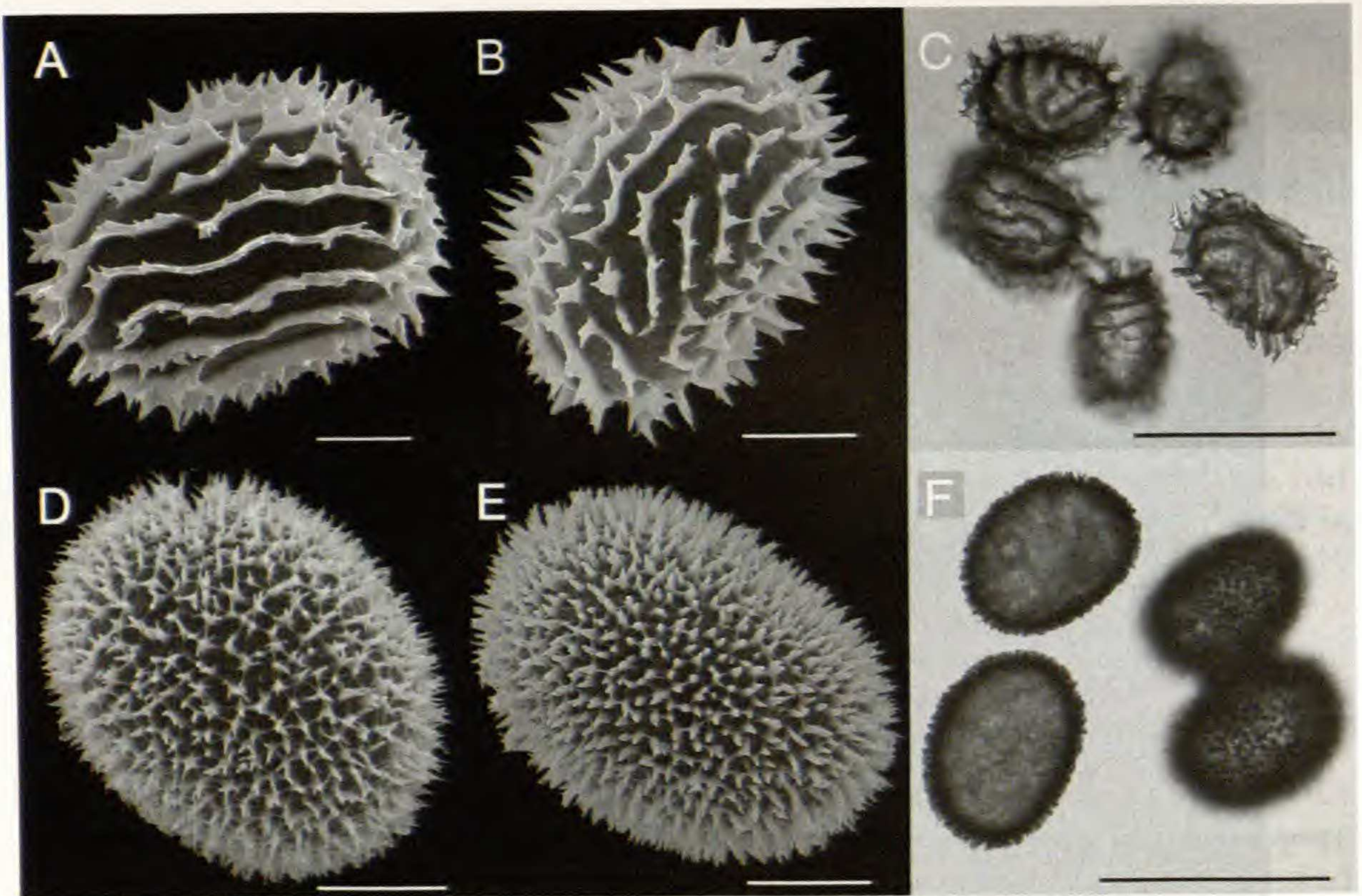


FIG. 2. Spores of Andean *Megalastrum*, showing cristate (A–C) and echinulate (D–F) perispores. A, B, D, and E were taken with the SEM; C and F with the light microscope. A. *M. falcatum*. B. *M. insigne*. C. *M. biseriale*. D. *M. fugaceum*. E. *M. nanum*. F. *M. fugaceum*. A: Cerón 1483 (MO). B: Grubb et al. 1195 (NY). C: Navarrete & Øllgaard 3047 (AAU). D: Serrano et al. 5225 (GOET). E: Moran & Rohrbach 5380 (MO). F: Huaylla et al. 1554 (NY). In A, B, D, and E, scale bars = 10 micrometers. In C and F, scale bars = 50 micrometers.

grooved or only shallowly so, scaly and pubescent abaxially, densely pubescent on the adaxial surfaces, the hairs whitish, spreading to antrorsely strigose, multicellular, if glands present, these ca. 0.1 mm wide, spherical, shiny, yellowish to orangish clear, sessile to stalked; *basal basisopic segment of pinnules* becoming decurrent and adnate to the pinna rachises, the vein supplying the segment springing from the pinna rachis instead of the costule; *hydathodes* present or (more rarely) absent; *indusia* absent or (less commonly) present, circular, brown, firm, attached at the base of a sinus, in some species minute and fugacious; *spores* monolete, nongreen, the perispores cristate or spiny, non-fenestrate or rarely so (2 species); $x=41$ (Kramer and Green 1990).

Etymology.—The name *Megalastrum* is taken from the Greek *mega-* for large, and *-Lastrea*, which refers to the genus *Lastrea* Bory named after Charles Jean Louis Delastre (1792–1859), a French botanist. When *Ctenitis* was first published (as a subgenus of *Dryopteris*), it included species now placed in *Ctenitis* (C. Chr.) C. Chr., *Megalastrum*, and *Triplophyllum* Holttum. Christensen later (1919 [1920]) recognized four informal species groups within the subgenus, one of which he called the “Group of *D. subincisa*.” This group is the same as what we are calling *Megalastrum*.

The following key relies heavily on characteristics of the hairs and scales, some of which are shown in Fig. 3, and the distribution of these structures on various parts of the leaf. Magnification of 30× and a strong light source are extremely helpful in the identification of the species. The perispore character used in couplet 5 (whether the spores are spiny or cristate) can be seen with 100× magnification.

KEY TO THE SPECIES OF *MEGALASTRUM* IN THE ANDEAN COUNTRIES

1. Indusia present, conspicuous, circular
 2. Pinna rachis scales bullate; laminae basally 4-pinnate; spores echinulate; s. Venezuela **10. M. crenulans**
 2. Pinna rachis scales flat (non-bullate); laminae basally 3-pinnate-pinnatisect; spores cristate; Colombia to Bolivia
 3. Pinna rachises abaxially with hairs 1.0–1.5 mm long; indusia pubescent with hairs 0.3–1.0 mm long **19. M. insigne**
 3. Pinna rachises abaxially with hairs 0.2–0.5 mm long; indusia without hairs or with a few hairs 0.1–0.2 mm long
 4. Pinna rachis scales thin and flaccid, entire, dull; hairs on the veins adaxially 0.5–0.7 mm long, 4–7-celled **1. M. acrosorum**
 4. Pinna rachis scales firm, denticulate apically, lustrous; hairs on the veins adaxially 0.3–0.5 mm long, 2–4-celled **4. M. andicola**
1. Indusia absent or (1 species) inconspicuous and appearing as tuft of whitish hairs in center of sorus
 5. Spores echinulate (Fig. 2D–F)
 6. Laminae 0.3–0.4 m long, medially 2-pinnate-pinnatisect **26. M. nanum**
 6. Laminae 0.8–3.0 m long, medially 3-pinnate-pinnatisect
 7. Laminae densely pubescent between the veins on both surfaces, the hairs often gland-tipped; indusia present, minute (< 0.2 mm long), fugacious and often apparently absent, usually evident as a tuft of whitish hairs in the center of the sorus. **2. M. adenopteris**
 7. Laminae glabrous between the veins on both surfaces or, if pubescent, the hairs not gland-tipped; indusia absent
 8. Pinna rachis scales clathrate; pinna rachises and costules abaxially evenly and densely pubescent by reddish hairs 0.2–0.6 mm long. . . **9. M. clathratum**
 8. Pinna rachis scales not clathrate; pinna rachises and costules abaxially glabrous to densely pubescent by whitish hairs ca. 1 mm long
 9. Laminae densely and conspicuously pubescent, the hairs 1.0–2.0 mm long **38. M. pulverulentum**
 9. Laminae sparsely and inconspicuously pubescent, the hairs 0.4–0.8 mm long **16. M. fugaceum**
 5. Spores cristate (Fig. 2A–C)
 10. Laminae medially 1- to 2-pinnate, most or all of the proximal pinnules adnate to the pinna rachis
 11. Pinna rachises and costules glabrous to sparsely and inconspicuously pubescent abaxially or (in *M. polybotryoides*) minutely glandular
 12. Basal basisopic pinnules enlarged and more deeply lobed than the suprabasal ones, often (especially on large leaves) overlapping the lamina rachis; rhizome scales entire to sparsely denticulate. **14. M. fibrillosum**
 12. Basal basisopic pinnules the same size and shape as the suprabasal ones, not overlapping the lamina rachis; rhizome scales strongly denticulate
 13. Pinna rachises and costules minutely glandular on both surfaces, adaxially with hairs absent **34. M. polybotryoides**

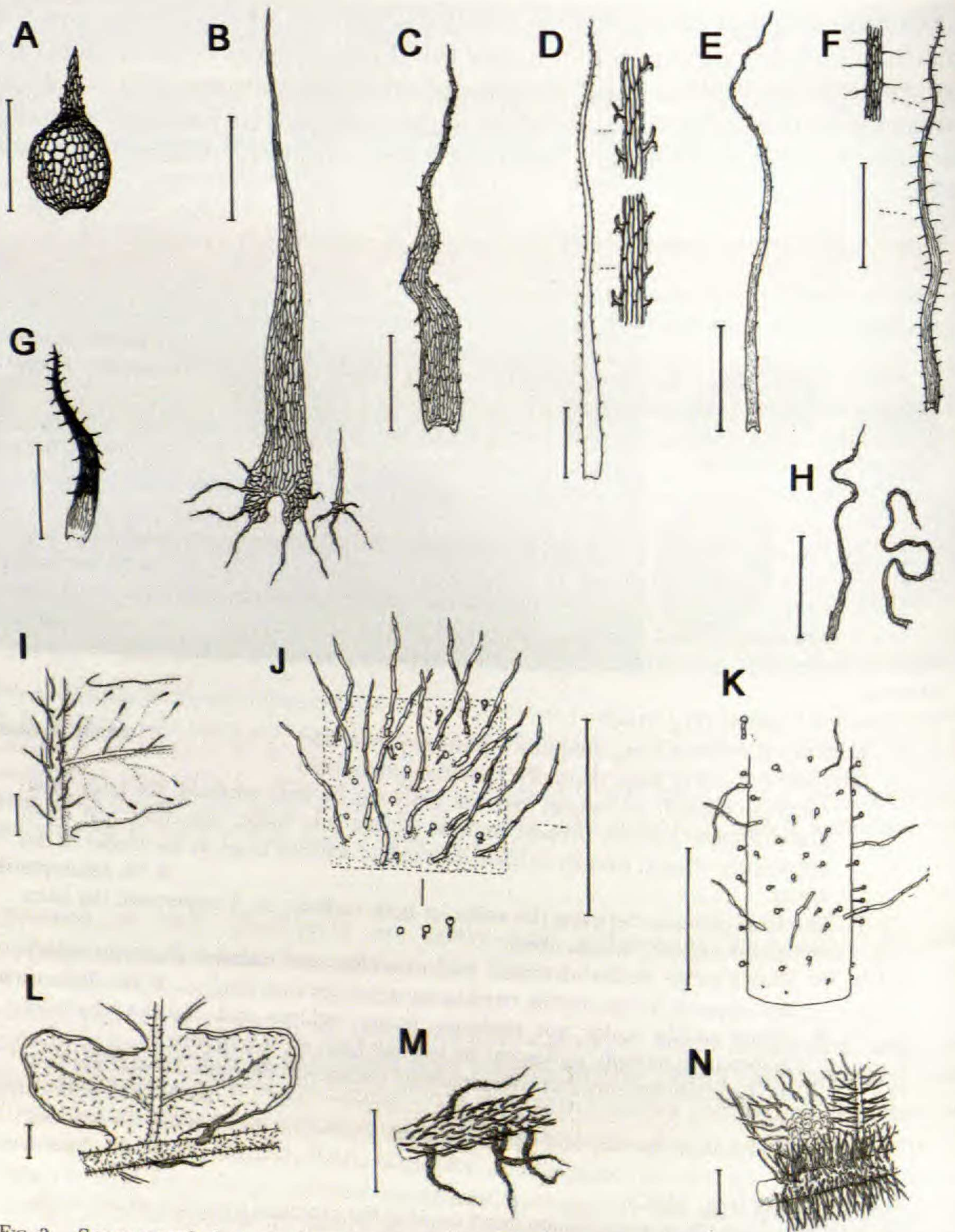


FIG. 3. Some morphological characters used in the key to species of *Megalastrum* from the Andes. A. Bullate scale from pinna rachis, *M. crenulans*. B. Lanceolate scale with ciliate base from pinna rachis, *M. decompositum*. C. Lanceolate scale, sparsely denticulate, from pinna rachis. D. Denticulate scale with bifid teeth, from lamina rachis, *M. fibrillosum*. E. Linear entire scale, from pinna rachis, *M. galapagense*. F. Linear denticulate scale from pinna rachis, *M. pulverulentum*. G. Lanceolate scale darkened toward apex, denticulate, from pinna rachis, *M. fugaceum*. H. Tortuous scales from pinna rachis, *M. reductum*. I. Hydathodes at the apices of the ultimate veins, *M. ciliatum*. J. Spreading hairs with sessile to stalked glands beneath, pinna rachis, *M. insigne*. K. Spreading hairs, pinnule base and costule, *M. vastum*. L. Short, even pubescence of erect acicular hairs, *M. vastum*. M. Spreading scales and antrorsely strigose hairs, from pinna rachis, *M. vastum*. N. Spreading scales and antrorsely strigose hairs, from pinnule base and costule, *M. vastum*.

13. Pinna rachises and costules eglandular on both surfaces, adaxially with hairs usually present
14. Pinna rachis scales filiform, tortuous **22. M. microsorum**
14. Pinna rachis scales lanceolate, not tortuous
15. Rhizome scales 2.5–6.5 mm long; pinnules or segments entire **11. M. ctenitoides**
15. Rhizome scales 10–20 mm long; pinnules or segments crenate to lobed **6. M. biseriale**
11. Pinna rachises and costules conspicuously densely to moderately pubescent abaxially
16. Ultimate veins pubescent on the adaxial surfaces, often conspicuously so
17. Veins adaxially with hairs ca. 0.5 mm long; Galapagos Islands **33. M. pleiosoros**
17. Veins adaxially with hairs 0.5–2.0 mm long; Colombia to Bolivia
18. Pinna rachises abaxially glandular, the glands stalked, ca. 0.1 mm long, 2-celled **24. M. molle**
18. Pinna rachises abaxially eglandular
19. Laminae glabrous between the veins on both surfaces; hairs of the lamina margin ca. 0.3 mm long; pinna rachises abaxially moderately scaly, the scales 0.2–0.3 mm wide, narrowly lanceolate **7. M. bolivianum**
19. Laminae pubescent between the veins on both surfaces; hairs of the lamina margin ca. 1 mm long; pinna rachises abaxially sparsely scaly, the scales 0.1 mm wide, filiform. **18. M. hirsutosetosum**
16. Ultimate veins glabrous or subglabrous on the adaxial surfaces
20. Lamina tissue between the veins abaxially pubescent
21. Basal pinnae equilateral **22. M. microsorum**
21. Basal pinnae inequilateral (prolonged basiscopically) **32. M. platylobum**
20. Lamina tissue between the veins abaxially glabrous.
22. Pinnules or segments entire; basal pinnae equilateral **11. M. ctenitoides**
22. Pinnules or segments (at least proximal ones) crenate to lobed; basal pinnae usually inequilateral **6. M. biseriale**
10. Laminae medially 2-pinnate-pinnatifid to 4-pinnate-pinnatisect, most or all of the proximal pinnules sessile but not adnate to the pinna rachis (except *M. fimbriatum*).
23. Laminae between the veins on both surfaces glabrous (sometimes a few hairs present adaxially near the margins).
24. Pinna rachises abaxially pubescent.
25. Ultimate veins with hairs 0.7–1.5 mm long on the adaxial surfaces
26. Hairs of the lamina margins 0.5–1.2 mm long, 5–9-celled, lax; hairs on the ultimate veins adaxially lax, slightly tortuous; northern Peru **15. M. fimbriatum**

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pinna rachis, *M. biseriale*. N. Dense, long straightish hairs, from pinna rachis, *M. ciliatum*. Scale bars = 1 mm. A: Brazil, Jürgens 206 (UC). B, C: Isotype, van der Werff et al. 12482 (MO). D: Isotype, van der Werff 2244, U. E: Jiménez I. 2547 (UC). F: Fay & Fay 3845 (NY). G: Serrano et al. 5225 (MO). H: Isotype, Camp 3786 (K). I: Fuentes et al. 9013 (MO). J: Øllgaard et al. 99554 (AAU). K: from Brazil, Jürgens s.n. [Rosenstock Filices Austrobrasiliensis no 206] (UC). L: Balslev et al. 1693 (NY). M: Stübel 770 (B). N: Fuentes et al. 9013 (MO).

26. Hairs of the lamina margins 0.3–0.5 mm long, 2- or 3-celled, straightish; hairs on the ultimate veins adaxially whitish and straight; northwestern Ecuador, Bolivia
27. Pinna rachis scales linear; northwestern Ecuador . . . **28. M. obtusum**
27. Pinna rachis scales lanceolate; Bolivia **20. M. marginatum**
25. Ultimate veins glabrous or with hairs 0.2–0.5 mm long on the adaxial surfaces
28. Pinna rachis scales ca. 0.2–0.5 mm wide, lanceolate to linear-lanceolate, not tortuous
29. Basal pinnae 30–50 cm long, inequilateral; laminae medially 3-pinnate-pinnatisect **3. M. alticola**
29. Basal pinnae 10–25 cm long, equilateral or subequilateral; laminae medially 2-pinnate-pinnatisect **13. M. falcatum**
28. Pinna rachis scales ca. 0.1–0.2 mm wide, filiform and slightly tortuous to linear and flat
30. Laminae basally 3-pinnate-pinnatisect; pinnules acuminate; pinna rachis scales denticulate **35. M. praetermissum**
30. Laminae basally 2-pinnate-pinnatisect; pinnules obtuse to acute; pinna rachis scales entire
31. Hairs on the pinna rachises abaxially uniformly 0.1–0.2 mm long **39. M. reductum**
31. Hairs on the pinna rachises abaxially of mixed sizes, 0.2–1.0 mm long **32. M. platylobum**
24. Pinna rachises abaxially without hairs.
32. Ultimate veins adaxially pubescent with hairs 0.5–1.5 mm long.
33. Sori with tuft of acicular whitish hairs 0.2–0.5 mm long; costules abaxially sparsely pubescent; southern Venezuela **45. M. tepuiense**
33. Sori without tuft of hairs; costules abaxially moderately to densely pubescent; northern Venezuela, Colombia, Ecuador, Bolivia
34. Pinna rachis scales filiform (2 or 3 cells wide), dark brown; veins adaxially moderately and conspicuously pubescent **35. M. praetermissum**
34. Pinna rachis scales lanceolate to linear-lanceolate (more than 3 cells wide), golden brown; veins adaxially sparsely and inconspicuously pubescent **5. M. aureisquama**
32. Ultimate veins adaxially glabrous
35. Lamina rachises and pinna rachises abaxially with sessile brownish glands **34. M. polybotryoides**
35. Lamina rachises and pinna rachises abaxially eglandular
36. Pinna rachis scales 0.1–0.2 mm wide, filiform
37. Laminae 2-pinnate-pinnatisect; basal pinnae ca. 22 cm long; pinna rachis scales entire; Ecuador, Peru **44. M. subtile**
37. Laminae 3-pinnate-pinnatisect; basal pinnae ca. 50 cm long; pinna rachis scales denticulate; northern Colombia and Venezuela **21. M. martinicense**
36. Pinna rachis scales 0.2–1.5 mm wide, lanceolate to linear-lanceolate
38. Basal pinnae 15–30 cm long; Bolivia **41. M. rupicola**
38. Basal pinnae 30–60 cm long; Venezuela to Bolivia
39. Pinna rachis scales strongly denticulate, dark brown, sometimes darker distally **29. M. oellgaardii**
39. Pinna rachis scales entire to subentire, golden brown to light pale brown throughout
40. Lamina rachises conspicuously scaly, the scales 0.5–2.0 mm wide **42. M. squamosissimum**

40. Lamina rachises inconspicuously scaly, the scales ca. 0.2–0.5 mm wide
41. Rhizome scales 5–15 mm long, dark brown; Bolivia
..... **5. M. aureisquama**
41. Rhizome scales 20–25 mm long, golden brown; northern Venezuela and Colombia
..... **43. M. subincisum**
23. Laminae between the veins on *one or both* surfaces pubescent
42. Laminae pubescent between the veins on only one surface
43. Lamina tissue between the veins abaxially glabrous
..... **35. M. praetermissum**
43. Lamina tissue between the veins abaxially pubescent
44. Basal pinnae 15–30 cm long; leaves up to 1 m long (often folded once and mounted on a single sheet)
45. Lamina rachises pubescent; hairs on the abaxial surface of the laminae gland-tipped; pinna rachis scales entire; rhizome scales concolorous (not black-margined). **36. M. pubescens**
45. Lamina rachises without hairs; hairs on the abaxial surface of the laminae not gland-tipped; pinna rachis scales denticulate; rhizome scales black-margined, at least intermittently
46. Hairs present on the ultimate veins adaxially; hairs on the abaxial surfaces of the laminae 0.8–1.0 mm long; hairs on the abaxial surfaces of the costules 0.7–1.0 mm long **8. M. ciliatum**
46. Hairs absent on the adaxial surfaces of the ultimate veins or only 1 or 2 present distally; hairs on the abaxial surfaces of the laminae 0.1–0.2 mm long; hairs on the abaxial surfaces of the costules 0.2–0.5 mm long
47. Pinna rachises abaxially without hairs; Bolivia
..... **41. M. rupicola**
47. Pinna rachises abaxially pubescent; Colombia
..... **27. M. nigromarginatum**
44. Basal pinnae 30–150 cm long; leaves 1.5–4.0 m long
48. Basal pinnae equilateral; laminae 2-pinnate-pinnatifid basally; Galapagos Islands **17. M. galapagense**
48. Basal pinnae inequilateral; laminae 3-pinnate-pinnatifid to 4-pinnate-pinnatifid basally; Andes
49. Pinna rachis scales 5–12 × 0.5–2 mm, entire to subentire except at sometimes ciliate bases **42. M. squamosissimum**
49. Pinna rachis scales 2–5 × 0.1–4 mm, strongly denticulate
50. Pinna rachises abaxially without hairs.
..... **35. M. praetermissum**
50. Pinna rachises abaxially pubescent
51. Hairs of the pinna rachises abaxially ca. 0.1 mm long, retrorsely strigose; Ecuador, Peru
..... **37. M. pubirhachis**
51. Hairs of the pinna rachises abaxially 0.2–0.3 mm long, spreading to erect; northern Colombia, southern Venezuela **30. M. oreophilum**
42. Laminae pubescent between the veins on both surfaces
52. Laminae basally 4-pinnate-pinnatisect, medially 3-pinnate-pinnatifid **12. M. decompositum**
52. Laminae basally 2- or 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect
53. Rachises and pinna rachises densely scaly, the scales 1.0–2.0 mm wide
..... **40. M. rhachisquamatum**

53. Rachises and pinna rachises sparsely to moderately scaly, the scales 0.1–1.0 mm wide
54. Hairs on the abaxial surfaces of the costules of mixed sizes, the smaller ones 0.1–0.3 mm long, the longer ones 0.7–1.0 mm long
55. Laminae basally 3-pinnate-pinnatisect; basal pinnae 25–40 cm long, inequilateral (prolonged basiscopically); pinnules sessile to short-stalked but not adnate; Colombia to Bolivia **23. M. miscellum**
55. Laminae basally 2-pinnate-pinnatifid; basal pinnae 8–15 cm long, equilateral; pinnules adnate; Galapagos Islands **33. M. pleiosoros**
54. Hairs on the abaxial surfaces of the costules about the same size, 0.2–0.4 mm long
56. Hairs of the lamina margins and tissue adaxially ca. 0.1 mm long; pinna rachis scales flaccid, dull, brown
57. Petiole and rachis scales dark brown, entire to sparsely denticulate; Colombia to Bolivia. **46. M. vastum**
57. Petiole and rachis scales golden brown, densely denticulate; northern Colombia, southern Venezuela **30. M. oreophilum**
56. Hairs of the lamina margins and tissue adaxially 0.4–0.8 mm long; pinna rachis scales firm, shiny, yellowish brown
58. Hairs on the ultimate veins adaxially 0.2–0.5 mm long; Colombia, Ecuador **25. M. mollicoma**
58. Hairs on the ultimate veins adaxially 0.5–1.5 mm long; Peru, Bolivia. **31. M. peruvianum**

SPECIES TREATMENTS

1. *Megalastrum acrosorum* (Hieron.) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:127. 1987 [published 3 May 1988]. *Nephrodium acrosorum* Hieron., Bot. Jahrb. Syst. 34:446. 1904. *Dryopteris acrosora* (Hieron.) C. Chr., Index Filic. 250. 1905. *Ctenitis acrosora* (Hieron.) Copel., Gen. Fil. 5:124. 1947. TYPE.—COLOMBIA. Depto. unknown: Cerro Pelado, 2000–2200 m, M. A. Stübel s.n. (lectotype, here designated: B! [barcode 200051888]; isoelectotype: BM! (frag.) [barcode 000907703]). **Figs. 4A–L, 5A, 6D.**

Rhizomes erect, up to 35 cm tall, the scales ca. 10.0×2 mm, appressed, lanceolate, brown, lustrous, flat, entire to sparsely denticulate; **leaves** 1.2–2.5 m long; **petiole base scales** like those of the rhizomes; **laminae** up to ca. 1.5 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** 25–45 cm long, strongly inequilateral; **pinna rachises** abaxially very sparsely glandular, densely pubescent, densely to sparsely scaly, the glands ca. 0.1 mm long, sessile, yellowish, the hairs 0.2–0.3 mm long, 2- or 3(4)-celled, acicular, tortuous, appressed to spreading, the scales $1.0\text{--}2.0 \times 0.3\text{--}0.8$ mm, broadly lanceolate, appressed, non-bullate, whitish to pale brown, thin and flaccid, entire, dull, not clathrate, not bullate, adaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.5–0.8 mm long, 5–7-celled, appressed to spreading, tortuous,

the scales like those abaxially; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially very sparsely provided with sessile glands, sparsely puberulent and sparsely scaly, the hairs like those of the pinna rachises, the scales ca. 1.5×0.3 mm, otherwise like those of the pinna rachises, adaxially eglandular, pubescent, scales absent, the hairs ca. 1 mm long, 5–7-celled, acicular, ascending, appressed; **laminar tissue between veins** abaxially sparsely provided with 0.1 mm long yellowish sessile glands, sparsely puberulent, the hairs 0.1–0.2(–3.0) mm long, 1- or 2-celled, erect, acicular, whitish, adaxially eglandular, densely pubescent, the hairs 0.3–0.5 mm long, 2–3-celled, erect to appressed, acicular; **ultimate veins** visible on both surfaces, abaxially sparsely glandular and puberulent, the glands and hairs like those of the laminar tissue between the veins, adaxially eglandular, sparsely pubescent, the hairs 0.5–0.7 mm long, 4–7-celled, acicular, erect to ascending; **lamina margins** eglandular, densely ciliate, the hairs 0.2–0.3 mm long, 2- or 3-celled, acicular, ascending; **indusia** present, conspicuous, circular, 0.5–0.7 mm wide, glandular, concolorous, brown, the margin and surface of the indusia glandular, pubescent to sparsely pubescent or sub-glabrous, the glands sessile, spherical, yellow to orange, the hairs 0.1–0.2 mm long, acicular, spreading; **spores** cristate.

Distribution and ecology.—Colombia, Ecuador, Peru; 1280–2150 m.

SELECTED SPECIMENS EXAMINED.—COLOMBIA. **Huila:** Cordillera Oriental, SE of Garzón, 1950 m, [9°8'7"N, 74°3'38"W], 7 Feb 1945, *Little 9415* (US).

ECUADOR. **Napo:** Road Baeza-Tena, 2 km N of Cosanga, 1900–2000 m, 0°34'S, 77°53'W, 19 Jan 1992, *Øllgaard et al. 99562* (AAU, QCA). **Pichincha:** Cordillera Occidental, casi 40 km por el camino oeste de Quito a Nono, 2150 m, 0°02'S, 78°38'W, 21 Jan 1984, *Moran 3567* (NY).

PERU. **Junín:** Chancamayo, Río Rondayacu, 45 km from San Ramón, 1880–1950 m, 11°20'S, 72°20'W, 15 Oct 1982, *Smith et al. 2615 p.p.* (AAU, F, MO, NY). **San Martín:** Huallaga, Saposoa, al sur de Añazco Pueblo, 2000 m, [6°56'S, 76°46'W], 3 Sep 2000, *Quipuscoa et al. 2340* (F, NY, UC).

Megalastrum acrosorum is distinguished by indusiate sori and rachises and costules abaxially with pale flaccid appressed scales. The other indusiate species of *Megalastrum* have pinna rachis scales firmer, spreading, denticulate (at least apically). The almost complete absence of glands on the pinna rachises and costules abaxially also helps to distinguish *M. acrosorum* from the other species. Most similar morphologically is *M. andicola*, which differs by the scale and pubescence characters given in the key.

Megalastrum acrosorum was originally described as having sori restricted toward the apex of the pinnules (thus the specific epithet). Although this is true for the original material, more recent specimens show that the sori may occur throughout the length of the pinnules. The restriction of sori toward the apex is diagnostic for *M. apicale* R. C. Moran & J. Prado, a species from Costa Rica and Panama long thought to be conspecific with *M. acrosorum* (e.g., by Smith and Moran 1995). *Megalastrum apicale* differs by pinna rachises abaxially with dark brown scales and hairs 0.5–0.7 mm long (Moran and Prado 2010).

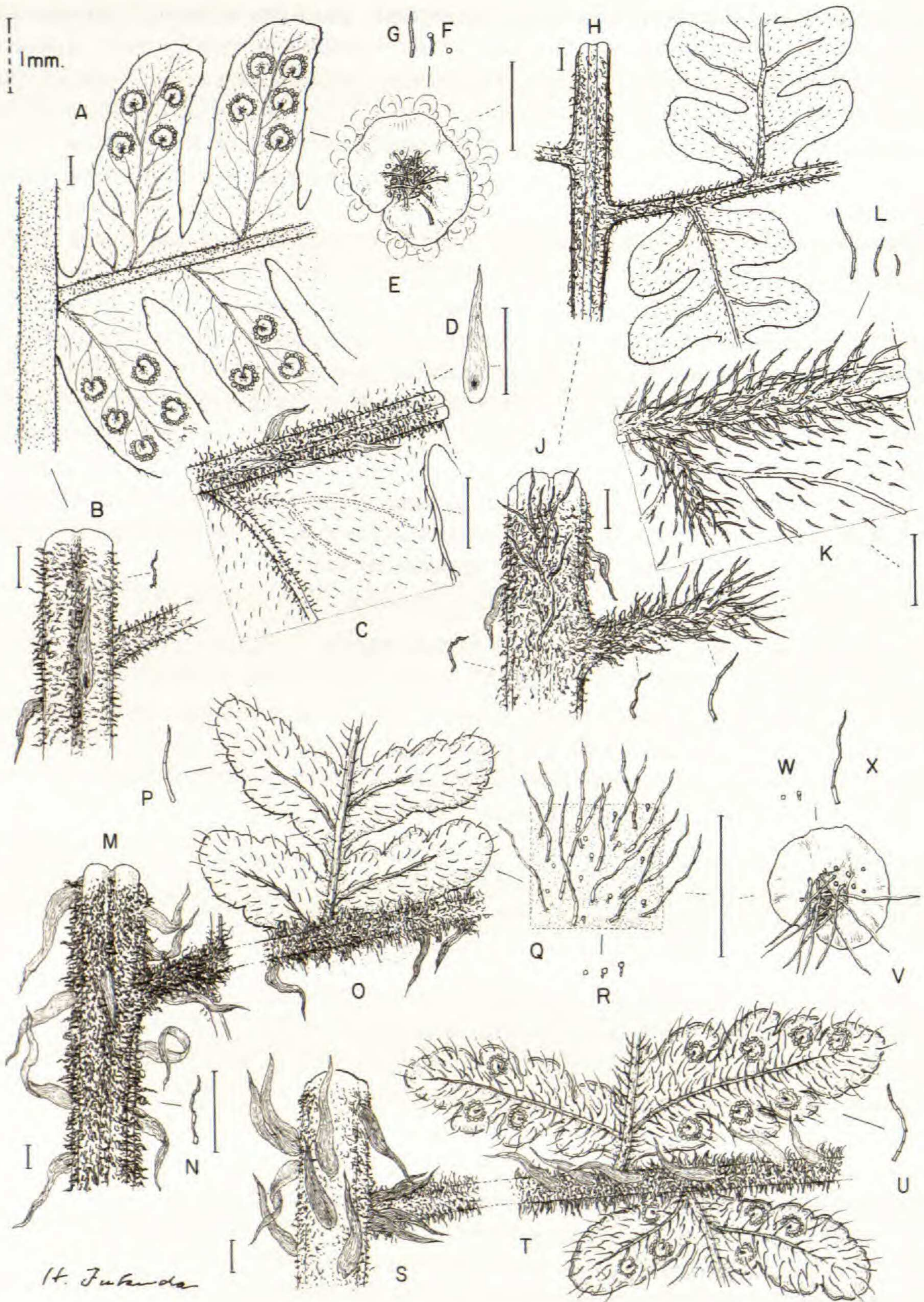


FIG. 4. Indument of two Andean species of *Megalastrum*. A–L. *M. acrosorum*. A. Abaxial surface of pinna rachis and costule. B. Adaxial surface of pinna rachis. C. Abaxial surface, detail of indument. D. Scale from costule. E. Sorus, note hairs and glands on indusium. F. Stalked gland at left, sessile gland at right. G. Non-glandular hair. H. Adaxial surface of pinna rachis and pinnules. J. Detail of hairs and scales. K. Ascending hairs on adaxial surface of the lamina. L. Hairs from

2. **Megalastrum adenopteris** (C. Chr.) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:127. 1987 [published 3 May 1988]. *Dryopteris adenopteris* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd., ser. 8, 6:85. 1920. *Ctenitis adenopteris* (C. Chr.) Ching, Sunyatsenia 5:250. 1940. TYPE.—BRAZIL. Rio Grande do Sul: Silveira Martins, Val Veneta, ad terram silvae primaevae, [29°39'S, 53°35'], 1893, C. A. M. Lindman s.n. (Regnell A 1313) (lectotype, designated by Moran *et al.*, 2009a: BM! [barcode 000907710], photo MICH!; isolectotypes: BM! [barcode 000907710], C-n.v., L-n.v., S-n.v.; U-n.v., UPS!, US! [barcode 00067050]; fragm. MO!). **Figs. 5B, 7A–G, 8B.**

Dryopteris villosa (L.) Kuntze var. *tomentosa* Rosenst., Hedwigia 46:130. 1916. TYPE.—BRAZIL. Rio Grande do Sul: Mun. Rio Pardo, Fazenda Soledade, [29°59'23"S, 52°22'41"W], 1906, L. C. Jürgens s.n. (Rosenstock Filices Austrobrasilienses no. 207) (lectotype, designated by Moran *et al.*, 2009a: MICH!; isolectotype: S! [accession 06-547]).

Dryopteris oreocharis Sehnem var. *canescens* Sehnem, Fl. Ilustr. Catarinense ASPI 1:177. 1979. TYPE.—BRAZIL. Santa Catarina: Lauro Müller, Novo Horizonte, [28°23'34"S, 49°23'49"W], 400 m, 24 Oct 1958, R. Reitz & R. M. Klein 7516 (lectotype, designated by Moran *et al.*, 2009a: PACA! [barcode 68744]; isolectotype: HBR!).

Rhizomes erect, up to 50 cm tall, the scales 10.0–20.0 × 1.0–2.0 mm, appressed to ascending, linear-lanceolate, orange, dull or shiny, twisted, slightly tortuous apically, sparsely denticulate; **leaves** up to 4 m long; **petiole base scales** like those of the rhizomes but more spreading; **laminae** 1.0–2.0 m long, basally 4-pinnate-pinnatifid, medially 3-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** up to 1.0 m long, inequilateral; **pinna rachises** on both surfaces glandular, puberulent, sparsely scaly, the glands ca. 0.1 mm long, stalked or sessile, yellowish, the stalked 2-celled, the sessile ca. 0.1 mm long, the hairs 0.1–0.3 mm long, 1–3-celled, acicular, erect, the scales denticulate, 0.5–2.5 × 0.2–0.5 mm, appressed, ovate to lanceolate, brown, lustrous, not clathrate, not bullate; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially glandular, puberulent, and sparsely scaly, the hairs, scales, and glands like those of the pinna rachises, adaxially with similar indument but the hairs 0.3–0.4 mm, 3- or 4-celled; **laminar tissue between veins** on both surfaces densely puberulent, the hairs ca. 0.1 mm long, 1- or 2-celled, spreading, often gland-tipped, the apical cell swollen or globose, yellowish to orangish; **ultimate veins** visible on both surfaces, both surfaces glandular, puberulent, the hairs and glands like those on the laminar tissue between the veins but the hairs ca.

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costule. M–X. *M. insigne*. M. Adaxial surface of rachis. N. Rachis hair. O. Adaxial surface of pinna rachis and pinnule. P. Hair. Q. Hairs and glands, adaxial surface of the lamina. R. Glands. S. Abaxial surface of rachis. T. Abaxial surface of pinna rachis and pinnules. U. Hair. V. Indusium with hairs and glands. W. Glands. X. Hair. All scale bars = 1 mm. A–L: Moran 3567 (NY). M–X: Øllgaard *et al.* 99554 (AAU).

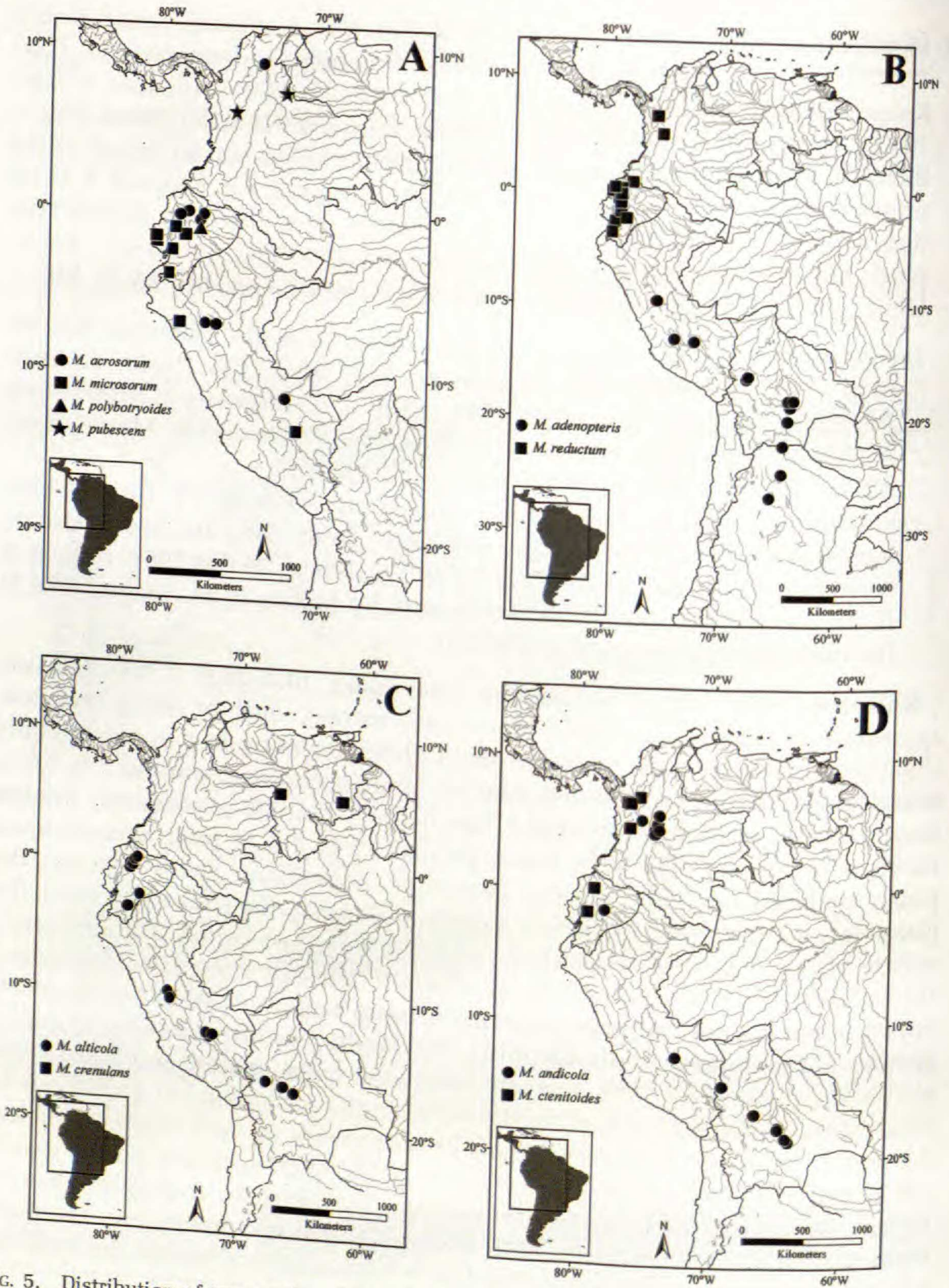


FIG. 5. Distribution of ten species of *Megalastrum* in the Andes. Some species are also known from areas outside the Andean region as here defined; for the worldwide distribution of a species, see under each species description.

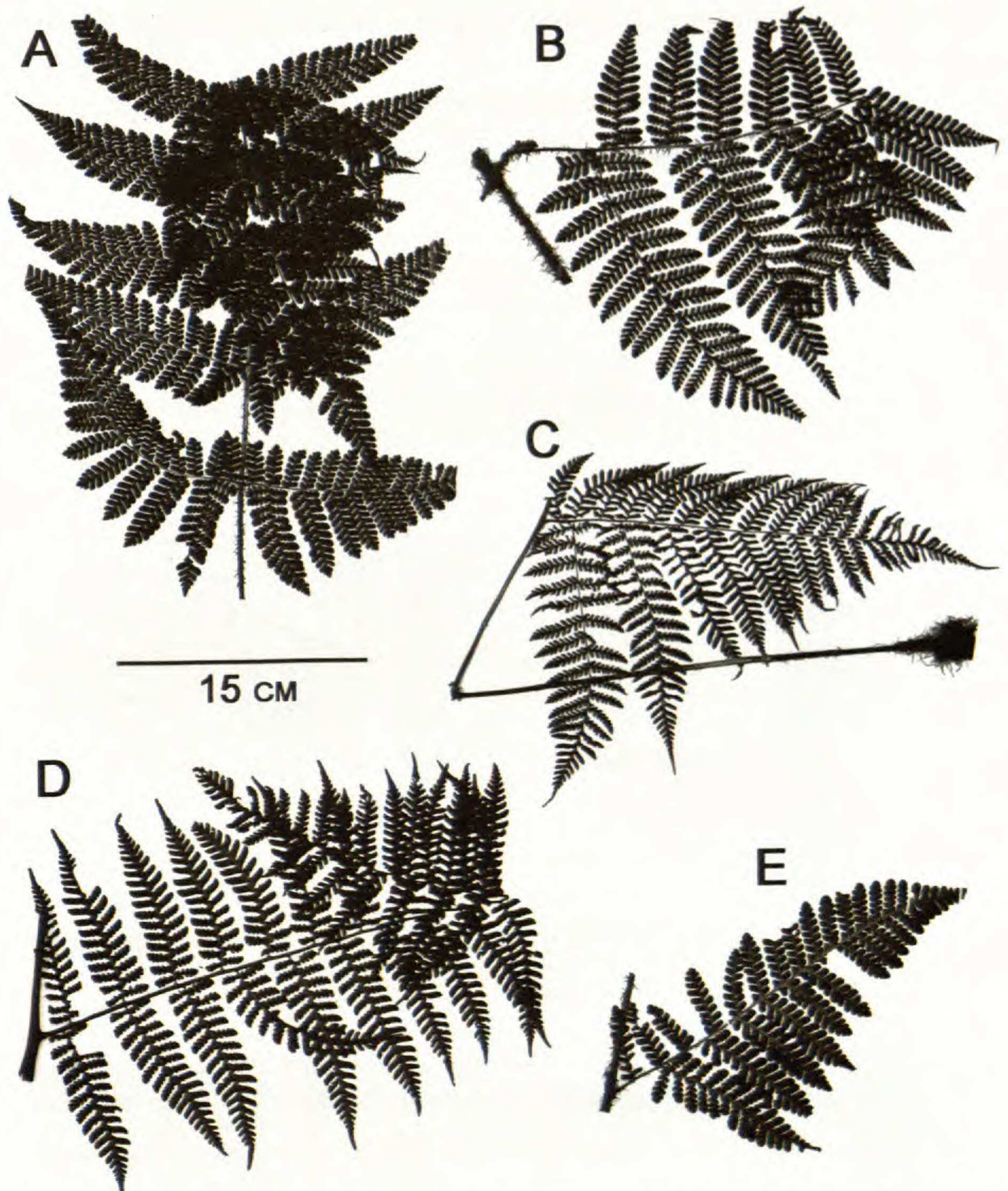


FIG. 6. Lamina dissection in the four indusiate species of Andean *Megalastrum*. A. Leaf, *M. andicola*. B. Basal pinna, *M. andicola*. C. Basal pinna, *M. crenulans*. D. Medial pinna, *M. acrosorum*. E. Basal pinna, *M. insigne*. A: Linden 243 (K). B: Núñez & Huaylla 279 (MO). C: Brazil, Handro 2224 (US). D: Moran 3567 (NY). E: Øllgaard & Navarrete 1630 (AAU).

0.3 mm long, 2- or 3-celled, adaxially the hairs 0.3–0.5 mm long, 2–4-celled; **lamina margins** eglandular, ciliate, the hairs 0.2–0.3 mm long, 1–3-celled, ascending to spreading; **indusia** < 0.2 mm wide, circular, fugacious and usually seemingly absent, eglandular, pubescent by whitish acicular hairs ca. 0.1 mm long; **spores** echinulate.

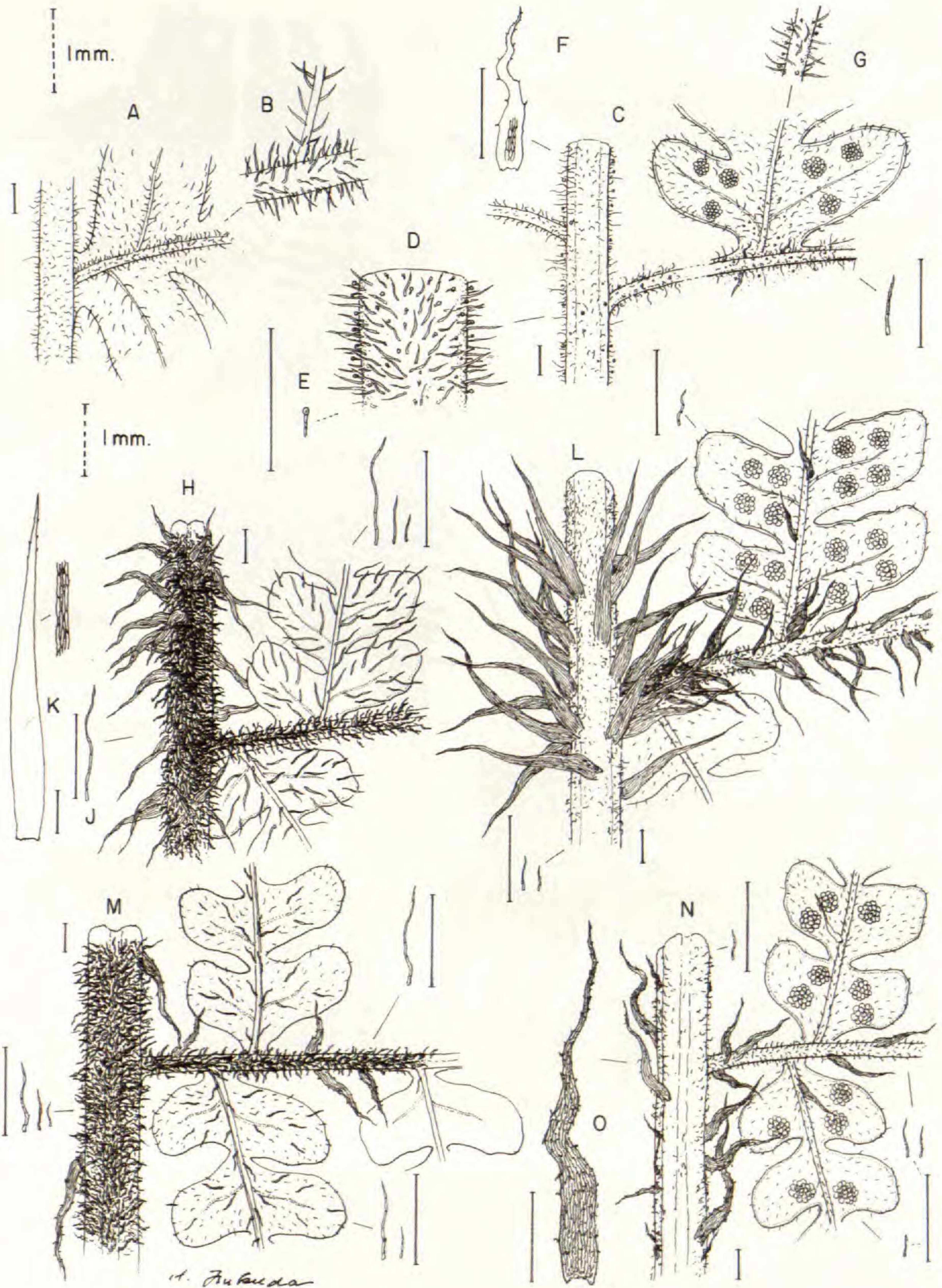


FIG. 7. Indument of three species of Andean *Megalastrum*. A-G. *M. adenopteris*. A. Adaxial surface of pinna rachis and pinnule. B. Detail of costular hairs. C. Abaxial surface of pinna rachis, costule, and pinnule. D. Pinna rachis. E. Glandular hair. F. Scale from pinna rachis. G. Details of hairs on costule. H-L. *M. rhachisquamatum*. H. Adaxial surface of pinna rachis, costule, and pinnule. J. Pinna rachis hair. K. Scale detail. L. Abaxial surface of pinna rachis, costule, and

Distribution.—Peru, Bolivia, northern Argentina, southeastern Brazil; 750–2100 m.

SELECTED SPECIMENS EXAMINED.—PERU. **Ayacucho**: Aina, between Huanta and Río Apurímac, 750–1000 m, [12°56'S, 74°15'W], 7–17 May 1929, *Killip & Smith 22779* (US). **Cusco**: Distr. Urubamba, en el camino del proyecto arqueológico Mando-Paturusi, ca. 115 km de Cusco, en Machupicchu, 2100 m, 13°09'S, 72°31'W, 4–6 Apr 1988, *Núñez V. 8929* (AAU, F, MO, NY, UC). **Huánuco**: Cochero, [9°35'S, 75°51'W], s.d., *Dombey s.n.* (P).

BOLIVIA. **Chuquisaca**: Herando Siles, 1575 m, 20°20'16"S, 62°02'42"W, 23 Dec 2005, *Serrano et al. 6873* (MO). **La Paz**: Prov. Nordyungas, Polo-Polo bei Coroico, [16°10'S, 67°43'W], Jun–Jul 1912, *Buchtien 3598* (BM, F, S, US). **Santa Cruz**: Valle Grande, 12 km de Loma Larga a Masicurí, 1250 m, 18°47'S, 63°57'W, 21 May 1996, *Kessler et al. 5971* (GOET, UC). **Tarija**: Aniseto Arce Ruíz, Campamento de guardaparques Sidras, senda La Cascada, 890 m, 22°14'S, 64°32'W, 19 Jun 2004, *Jiménez et al. 2468* (UC).

ARGENTINA. **Salta**: Parque Nacional El Rey, [24°41'S, 64°36'W], 21 Mar 1981, *Brown 1339* (MO, NY). **Tucumán**: Depto. Tafí, Quebrada de Cainzo, 900 m, [26°49'S, 65°37'W], 18 Nov 1951, *Sleumer 2097* (BM).

Megalastrum adenopteris has several distinctive characters that, in combination, make it easy to identify. The species is characterized by large, highly divided leaves and laminae on both surfaces between the veins densely and evenly pubescent. The hairs are often gland-tipped with the terminal cell enlarged or globose, yellowish or orangish. The veins tips are slender, not enlarged and hydathodous as is typical in the genus. The indusia are distinctive by being minute (< 0.2 mm wide) and pubescent. After drying and contracting, they often appear as a tuft of whitish acicular hairs in the center of the sorus. This species is a member of the *M. pulverulentum* group.

3. *Megalastrum alticola* M. Kessler & A. R. Sm., *Amer. Fern J.* 96:36. 2006. TYPE.—BOLIVIA. **La Paz**: Prov. Nor Yungas, 2 km de Chuspipata hacia Coroico, 16°22'S, 67°49'W, 2900 m, 17 Sep 1997, *M. Kessler 11945* (holotype: UC! [barcode 1621224, 1621225]; isotypes: GOET!, LPB-n.v.). **Figs. 5C, 9F–K, 10D.**

Rhizomes erect, the scales 6.0–10.0 × 1.0–2.0 mm, ascending, linear-lanceolate, brown, dull, flat, sparsely denticulate; **leaves** 1.0–2.5 m long; **petiole base scales** 10.0–15.0 × 1.0–1.5 mm, spreading to ascending, linear-lanceolate, brown, dull, lustrous, flat, not tortuous, denticulate, the teeth simple or sometimes bifid; **laminae** up to ca. 1.5 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect; **lamina rachises** without hairs

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pinnule. M–O. *M. decompositum*. M. Adaxial surface of pinna rachis, costule, and pinnules. N. Abaxial surface of pinna rachis, costule, and pinnules. O. Detail of rachis scale. Scale bars = 1 mm. A–G: from Brazil, isoelectotype, *Jürgens s.n.* [Rosenstock Filices Austrobrasilienses no. 207] (S). H–L: Isotype, *Palacios 5844* (MO). M–O: Isotype, *van der Werff et al. 12482* (MO).

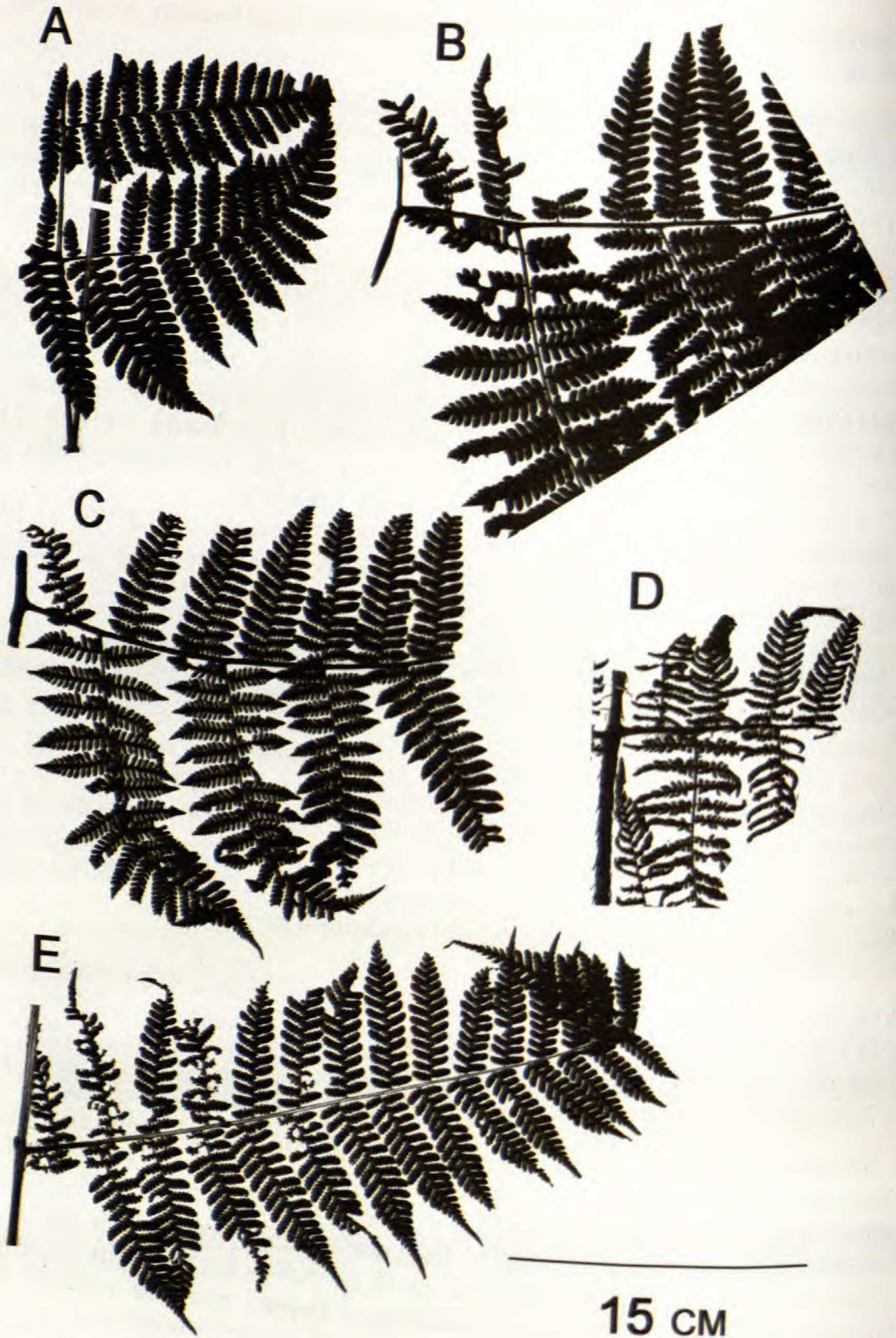


FIG. 8. Lamina dissection in the four Andean species of the *Megalastrum* "pulverulentum" group. A. Proximal pinnae, *M. nanum*. B. Proximal part of basal pinna, *M. adenopteris*. C. Proximal part of basal pinna, *M. pulverulentum*. D. Proximal part of basal pinna, *M. clathratum*. E. Basal pinna, *M. pulverulentum*. A: Holotype, Moran 5917 (AAU). B: Brazil, Venturi 886 (US). C: West Indies, Ekman 5747 (NY). D: Holotype, van der Werff et al. 23175 (MO). E: Spruce 5257A (K).

abaxially; **basal pinnae** 20–30 cm long, inequilateral, longer basiscopically; **pinna rachises** abaxially eglandular, pubescent, scaly, the hairs 0.2–0.4 mm long, 3–5-celled, spreading to slightly ascending and tortuous, the scales denticulate, sometimes with bifid teeth, spreading to ascending or appressed, $2.5\text{--}7.0 \times 0.5\text{--}1.0$ mm, lanceolate to linear-lanceolate, brown to light brown, lustrous, not clathrate, not bullate, adaxially very sparsely glandular, densely pubescent, sparsely scaly, the glands ca. 0.1 mm long, sessile, brownish, the hairs 0.6–1.0 mm long, 4–7-celled, spreading to antrorsely strigose, scales like those on the abaxial surfaces; **costules** abaxially rarely glandular, pubescent, scaly, the glands ca. 0.1 mm, sessile, globose, yellowish, the hairs 0.2–0.4 mm long, 2- or 3-celled, spreading, scales $0.5\text{--}1.0 \times 0.2\text{--}0.3$ mm, spreading to loosely appressed, lanceolate, entire to denticulate, adaxially eglandular, sparsely to moderately pubescent, scales absent, the hairs 0.4–0.7 mm long, 2–5-celled, antrorsely strigose; **laminar tissue between veins** on both surfaces eglandular, glabrous; **ultimate veins** surfaces abaxially visible, obscure adaxially, eglandular, abaxially pubescent, the hairs 0.1–0.2 mm long, 1- or 2-celled, spreading to ascending, adaxially the hairs absent or 0.2–0.5 mm long, 3–5-celled, spreading; **lamina margins** eglandular, ciliate, the hairs 0.1–0.3 mm long, 1- or 2-celled, ascending; **indusia** absent; **spores** cristate.

Distribution.—Ecuador, Peru, Bolivia; 1600–3400 m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Cotopaxi:** Cantón Sigchos, bosque en sucesión, dosel ca. 8 m, por fuente de agua, 3400 m, $0^{\circ}35'40''\text{S}$, $78^{\circ}49'54''\text{W}$, 21 Jul 2003, *Ramos et al.* 6371 (MO, QCNE). **Imbabura:** Carretera Otavalo-Selva Alegre, 2800–3200 m, [$0^{\circ}14'\text{N}$, $78^{\circ}16'\text{W}$], 13 Feb 1989, *van der Werff & Palacios* 10570 (MO, MICH, QCNE). **Morona-Santiago:** road Plan de Milagro-Gualaceo, Km 10.8, 2200–2250 m, $3^{\circ}00'\text{S}$, $78^{\circ}32'\text{W}$, 24–25 Nov 1997, *Ollgaard & Navarrete* 2755 (AAU, QCA). **Pichincha:** Valle de Lloa, 2800 m, [$0^{\circ}15'\text{S}$, $78^{\circ}34'\text{W}$], 1919, *Mille s.n.* (GH, NY, P, S).

PERU. **Cusco:** Prov. La Convención, Distr. Huayopata, Huyro, Calquiña, 1750 m, $12^{\circ}58'51''\text{S}$, $72^{\circ}03'31''\text{W}$, 27 Jun 2003, *Bonino et al.* 746 (MO, NY, UC). **Huánuco:** Cushi, 1600 m, [$9^{\circ}51'0''\text{S}$, $75^{\circ}41'0''\text{W}$], 19–23 Jun 1923, *MacBride* 4855 (F, US). **Junín:** Chanchamayo, Chilpez ca. 26 km of San Ramón, 1720–1850 m, $10^{\circ}16'\text{S}$, $75^{\circ}22'\text{W}$, 19 Oct 1982, *Smith & Palacios* 2639 (F, MO). **Pasco:** Oxapampa, Distr. Huancabamba, Sector Quebrada Yanachaga (Parque Nacional Yanachaga-Chemillen), 2260 m, $10^{\circ}23'45''\text{S}$, $75^{\circ}28'55''\text{W}$, 18 Sep 2004, *Mellado & Becerra* 1803 (MO); idem, 2410 m, $10^{\circ}23'20''\text{S}$, $75^{\circ}28'26''\text{W}$, 20 Sep 2004, *Mellado & Becerra* 1835 (MO).

BOLIVIA. **Cochabamba:** Prov. Tiraque, El Limbo, 2180 m, $17^{\circ}09'39.4''\text{S}$, $65^{\circ}37'18''\text{W}$, 21 Aug 2003, *Zabalaga* 1282 (NY). **La Paz:** Coroico, Nor Yungas, estrada de Coroico para Caranavi, Próximo a Chuspipata, 3000 m, $16^{\circ}17'48''\text{S}$, $67^{\circ}48'46''\text{W}$, 27 Feb 2008, *Labiak* 4730 (NY, UPCB).

Among the large decomposed species of the genus, *Megalastrum alticola* is characterized by pinna rachises abaxially pubescent and with lanceolate brown scales, the scales relatively large ($2.5\text{--}7.0 \times 0.5\text{--}1.0$ mm), and the laminar tissue between the veins glabrous on both surfaces. The species most

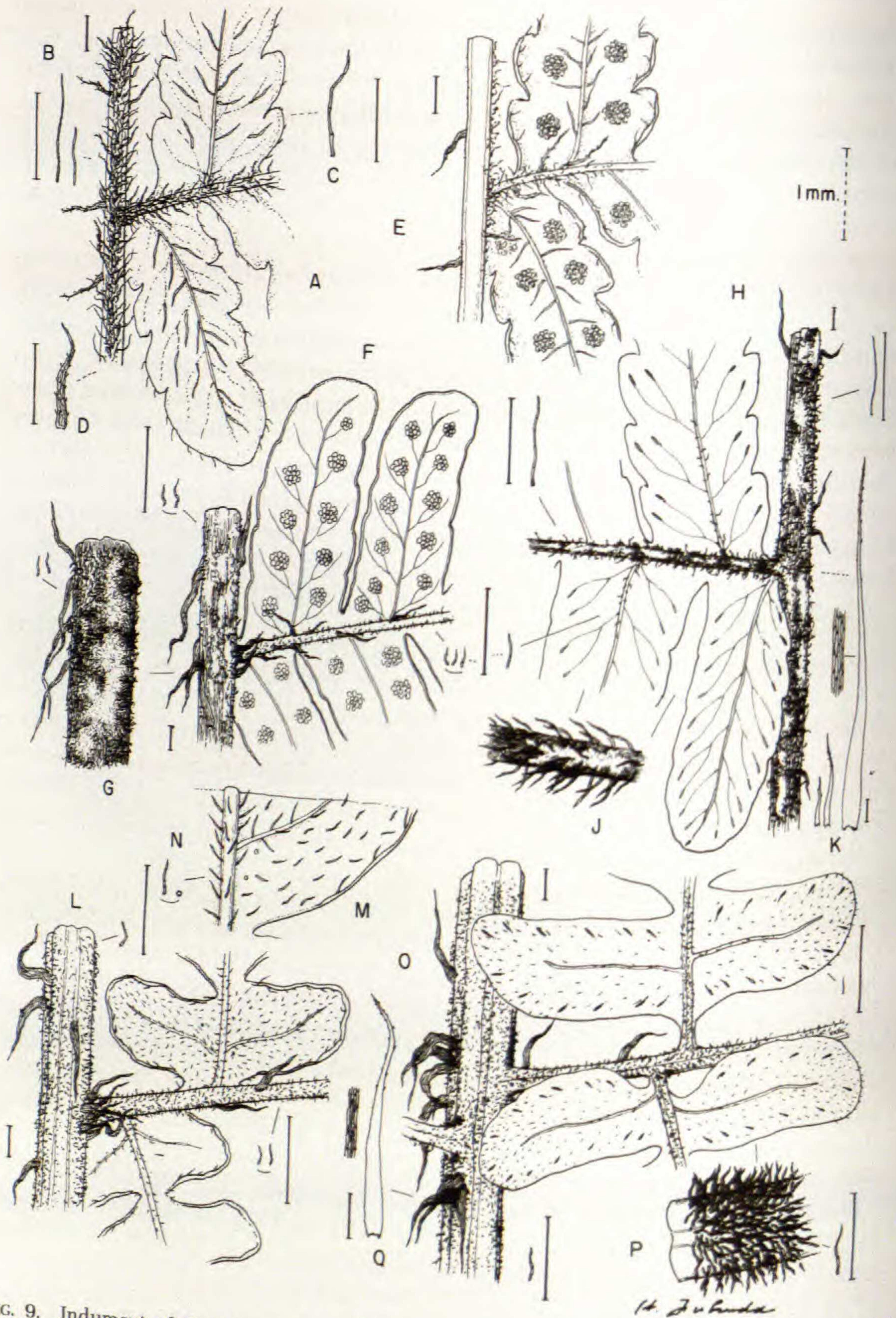


FIG. 9. Indument of three species of Andean *Megalastrum*. A-E. *M. marginatum*. A. Adaxial surface of pinna rachis, costules, and pinnules. B. Rachis hairs. C. Hair from vein. D. Rachis scale. E. Adaxial surface of pinna rachis, costules, and pinnules. F-K. *M. alticola*. F. Adaxial surface of pinna rachis, costules, and pinnules. G. Detail of lamina rachis. H. Adaxial surface of pinna rachis, costules, and pinnules. J. Pinna rachis with hairs. K. Abaxial surface of pinna rachis, costule, and pinnules. P. *M. ...*

resembles *M. squamosissimum*, which differs by pinna rachises glabrous abaxially. *Megalastrum alticola* is less scaly than *M. squamosissimum*, and this is evident on the rachis of the leaf, which has widely spreading conspicuous scales in *M. squamosissimum*, but only a few scattered appressed scales in *M. alticola*.

4. *Megalastrum andicola* (C. Chr.) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:127. 1987 [published 3 May 1988]. *Nephrodium villosum* var. *opacum* Mett. ex Hieron. f. *opacum* Hieron., Bot. Jahrb. Syst. 34:446. 1904, "var. *opaca*", "f. *spruceanum*". *Dryopteris andicola* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math Afd., ser. 8, 6:88. 1920. *Dryopteris andicola* C. Chr. f. *spruceana* (Hieron.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math Afd., ser. 8, 6:89. 1920. *Ctenitis andicola* (C. Chr.) Ching, Sunyatsenia 5:250. 1940. TYPE.—ECUADOR. Pastaza: Canelos [1°30'S, 78°03'W], s.d., R. Spruce 5295 *pro parte* [mixed with *M. insigne*] (lectotype, designated by Christensen, 1920: B! [barcode 20 0052340], B! [barcode 20 0052341]; isoelectotype: P! [barcode 000610853]). **Figs. 5D, 6A,B, 11M–T, U–D'.**

Dryopteris villosula C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math Afd., ser. 8, 6:89. 1920, stat. nov. for *D. villosa* var. *inaequalis*. *Dryopteris villosa* (L.) Kuntze var. *inaequalis* Gilbert, Bull. Torr. Bot. Club 24:259. 1897. *Ctenitis villosula* (C. Chr.) Ching, Sunyatsenia 5:250. 1940. *Megalastrum villosulum* (C. Chr.) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:129. 1987 [published 3 May 1988]. TYPE.—BOLIVIA. La Paz: Prov. Nor Yungas: Uchumachi [coordinates unknown], 22 Aug 1894, M. Bang 2394 (lectotype, here designated: NY! [barcode 579283]; isoelectotypes: B! (fragm.) [barcode 20 0069338] BM! [barcode 000907834], *pro parte* (mounted with *M. adenopteris*), GH!, MICH!, MO! [accession 1872834], NY! [barcode 00579283, 00579284], US! [accession 32988]).

Nephrodium villosum L. var. *opacum* Mett. ex Hieron. f. *lehmannianum* Hieron, Bot. Jahrb. Syst. 34:446. 1904. *Dryopteris andicola* C. Chr. f. *lehmanniana* (Hieron.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math Afd., ser. 8, 6:89. 1920. *Megalastrum andicola* (C. Chr.) A. R. Sm. & R. C. Moran f. *lehmannianum* (Hieron.) Stolze, Fieldiana, Bot., n.s. 27:19. 1991. TYPE.—COLOMBIA. Cundinamarca: Fusagasuga [4°20'N, 74°21'W], 1800–2400 m, Jan 1892, F. C. Lehmann 7369 (lectotype, designated by Tryon and Stolze, 1991: B! [barcode 20 0052347]; isoelectotypes K!, US! [accession 1424842]).

Rhizomes erect to decumbent, scales 10.0–15.0 × 0.6–1.0 mm, appressed to ascending, lanceolate, brown, dull, flat, sparsely denticulate; **leaves** 0.9–2.5 m

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pinnules. L–Q. *M. vastum*. L. Detail of hairs on costule and segments. M. Adaxial surface of pinna rachis, costule, and pinnules. N. Rachis scale. Scale bars = 1 mm. A–E: Krömer et al. 100 (UC). F–K: MacBride 4855 (F). K–O: Balslev et al. 1693 (NY).

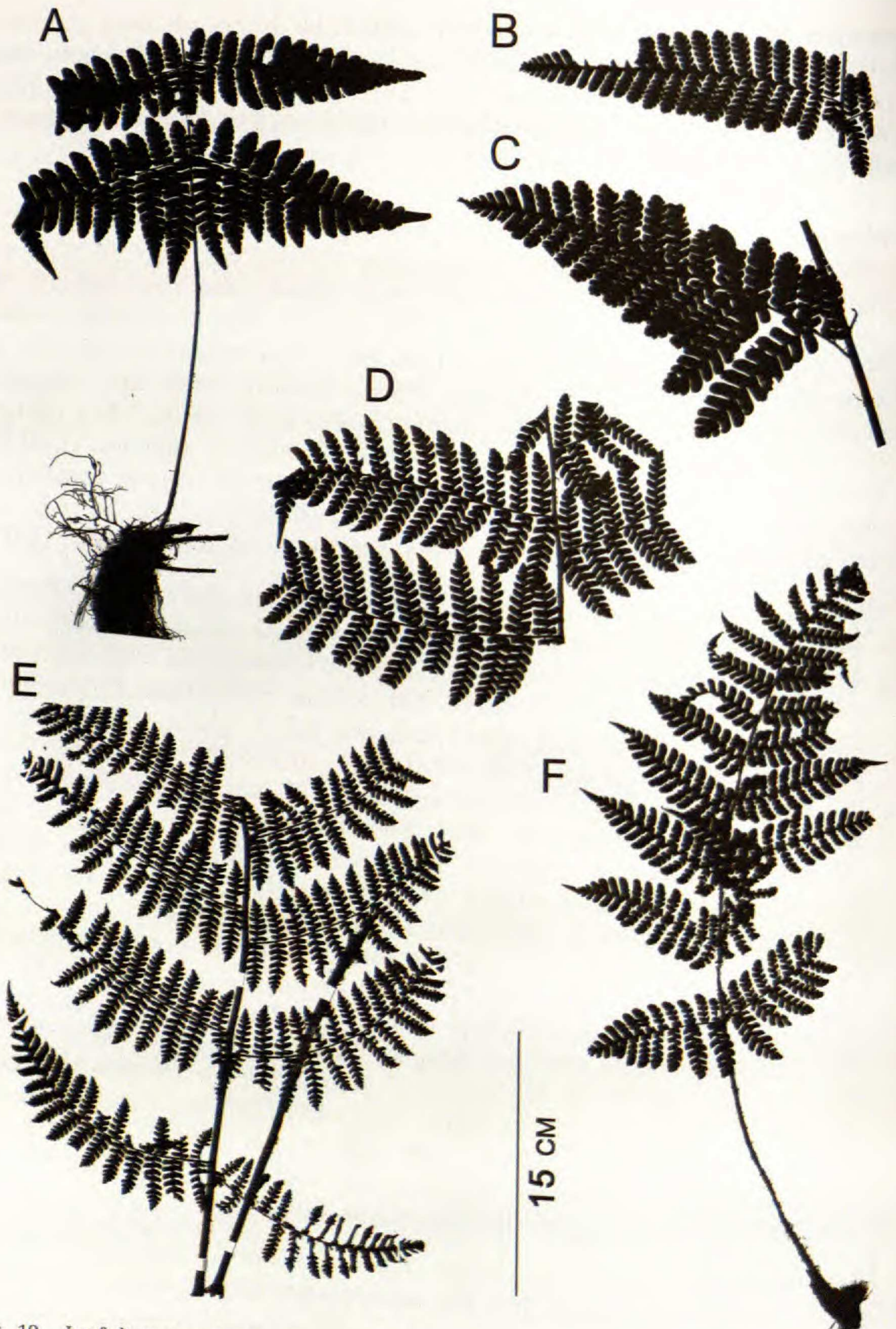


FIG. 10. Leaf dissection in three species of *Megalastrum*. A. Proximal pinnae, *M. marginatum*. B, C. Medial pinna and basal pinna, *M. obtusum*. D. Medial pinnae, *M. alticola*. E. Proximal half of lamina, *M. falcatum*. F. Leaf, *M. fimbriatum*. A: Bach 1234 (UC). B, C: Isotype, Ankersen & Kragelund 211 (AAU). D: Mellado & Beccera 1835 (MO). E: Øllgaard & Navarette 105854 (AAU). F: Isotype, Young & León 4958 (AAU).

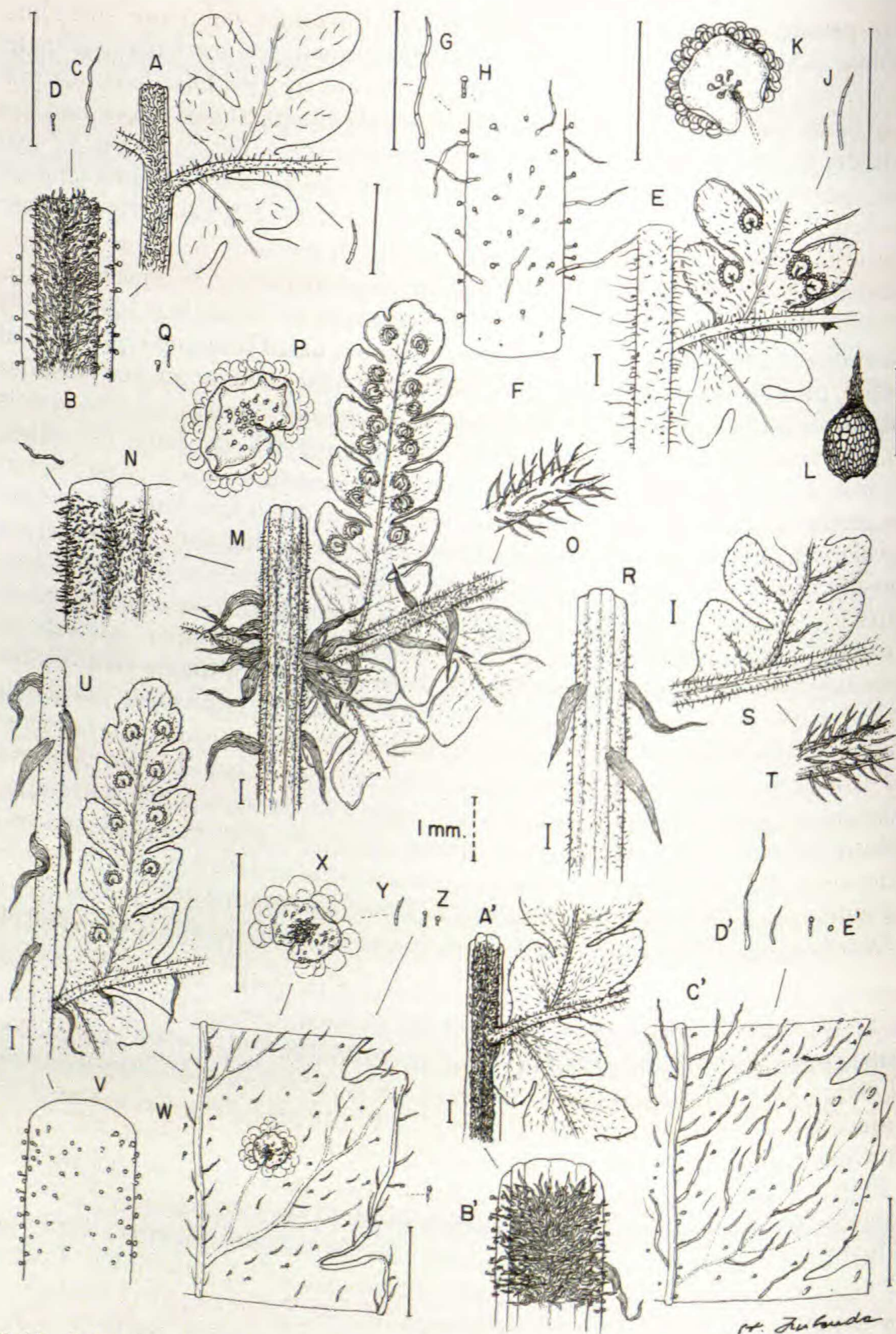
long; **petiole base scales** like those of the rhizomes but more spreading; **laminae** 0.5–0.8 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect; **lamina rachises** abaxially pubescent by glandular hairs 0.1 mm long; **basal pinnae** 15.0–40.0 cm long, strongly inequilateral; **pinna rachises** abaxially glandular, densely pubescent, sparsely scaly, the glands ca. 0.1 mm long, spherical, sessile and stipitate, yellowish, the hairs 0.1–0.5 mm long, 2–4-celled, acicular, erect to spreading, the scales ca. $4.0\text{--}7.0 \times 0.5\text{--}0.8$ mm, light brown to golden brown, denticulate apically, lanceolate, firm, lustrous, not clathrate, not bullate, adaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.5–1.2 mm long, 5–8-celled, spreading to ascending, acicular, the scales like those of the pinna rachises abaxially; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially sparsely glandular, sparsely to moderately pubescent, the glands 0.1 mm, sessile, spherical, yellowish, the hairs 0.1–0.5 mm long, 1–4-celled, acicular, ascending to erect, adaxially sparsely glandular, sparsely pubescent, the glands similar to those abaxially, the hairs 0.3–1.0 mm long, 3–6-celled, acicular, ascending to erect; **laminar tissue between veins** abaxially densely to sparsely glandular, sparsely to densely puberulent, the glands ca. 0.1 mm, stalked to sessile, yellowish, the hairs ca. 0.1 mm long, 1- or 2-celled, erect, acicular, more common near the axes, adaxially eglandular, sparsely to densely pubescent, the hairs similar to those abaxially; **ultimate veins** visible on both surfaces, abaxially with sessile glands, sparsely puberulent, the glands and hairs like those of the costules, adaxially sparsely pubescent, the hairs 0.3–0.5 mm long, 2–4-celled, spreading to ascending; **lamina margins** eglandular, ciliate, the hairs 0.2–0.3 mm long, 1–3-celled, acicular, ascending; **indusia** present, 0.5–1.0 mm wide, conspicuous, circular, glandular, sparsely pubescent, the glands 0.1 mm long, spherical, sessile to stalked, the hairs 0.1–0.2 mm long, 2-celled, acicular, erect, hyaline; **spores** cristate.

Distribution and ecology.—Colombia, Ecuador, Peru, Bolivia; 1400–2400 m.

SELECTED SPECIMENS EXAMINED.—COLOMBIA. **Antioquia:** Aguadita, [5°21'N, 75°21'W], 14 Jul 1934, *Guevara 75* (US). **Boyacá:** Carretera Chiquinquirá a Pauna, Puente de Piedra, 2050 m, [5°41'N, 74°01'W], 13 Oct 1967, *Jaramillo et al. 3517* (NY). **Cundinamarca:** Bosques de El Ermitaño, al S del Salto del Tequendama, 2200–2300 m, [4°37'N, 74°21'W], 18 May 1959, *Uribe 3286* (US). **Province Unknown,** 1842, *Linden 843* (BM, K, P).

PERU. **Cusco:** La Convención, above Qillouno, 2300 m, 12°28'35"S, 72°29'15"W, 29 Apr 2006, *van der Werff et al. 21118* (MO, NY).

BOLIVIA. **Carrasco:** Cochabamba, Localidad Dianpampa, 2160 m, 17°40'53"S, 64°40'55"W, 4 Sep 2003, *Fernández et al. 2362* (MO). **Cochabamba:** Prov. Ayopaya, comunidad Pampa Grande, subiendo por el sendero río arriba, pasando la primera área de cultivo, 2150 m, 16°40'S, 66°28'W, 7 Sep 2002, *Jiménez & Moguel 1428* (UC). **La Paz:** Prov. Franz Tamayo, Parque Nacional Madidi, senda Keara-Mojos, abajo de Fuertecillos, 2020 m, 14°35'S, 68°56'W, 6 Nov 2001, *Jiménez & Gallegos 877* (GOET, UC). **Santa Cruz:** Manuel M. Caballero, El Cocotal sobre el camino a San Mateo a 8.5 km del



H. J. Kubacka

FIG. 11. Indument of two Andean species of *Megalastrum*. A-L. *M. crenulans*. A. Adaxial surface of rachis and pinnules. B. Adaxial surface of rachis; note stipitate glands. C. Hair from rachis. D. Gland from rachis. E. Abaxial surface of rachis and pinnules. F. Rachis, showing hairs and stipitate glands. G. Hair. H. Stalked gland. J. Hairs from lamina surface between veins. K. Sorus, note glands on indusium. L. Bullate scale from pinna rachis. M-T. *M. andicola*. M. Abaxial surface of rachis

cruce El Empalme, 2285 m, 17°48'15"S, 64°42'12"W, 21 Jun 2003, Núñez & Huaylla 279 (MO, NY); Valle Grande, 5 km de Loma Larga a Valle Grande, 2100 m, 18°43'S, 63°54'W, 8 Jun 1996, Kessler et al. 6379 (UC). Yungas, Uchimachi, 22 Aug 1894, Bang 2394 (B, GH, MICH, MO, NY, US).

Megalastrum andicola is distinguished by indusia present and pinna rachis scales firm, denticulate apically, and lustrous. This species most resembles *M. acrosorum*, which differs by pinna rachises thin, flaccid, entire, and dull. Specimens from Bolivia tend to have laminae on both surfaces more glandular with gland-tipped hairs intergrading with sessile spherical ones. Such specimens have been segregated as *M. villosulum*; however, *M. andicola* s.s. is also glandular between the veins. The difference is only a matter of degree, and therefore *M. villosulum* is here placed in synonymy.

Lindig 159 and *Spruce 5295 pro parte* (B) have conspicuously bicolorous indusia with pale, thin outer edges, but this character does not appear in the remainder of the material and is not a diagnostic. *Ollgaard 99562* (AAU) from Napo, Ecuador, differs from other collections by having spreading scales on the petioles and pinna rachises. *Spruce 5295* is a mixed collection including *Megalastrum andicola* as well as *M. insigne*. Duplicates of *Spruce 5295* at BM, K, NY, and P are referable to *M. insigne*; only the specimens at B are *M. andicola*.

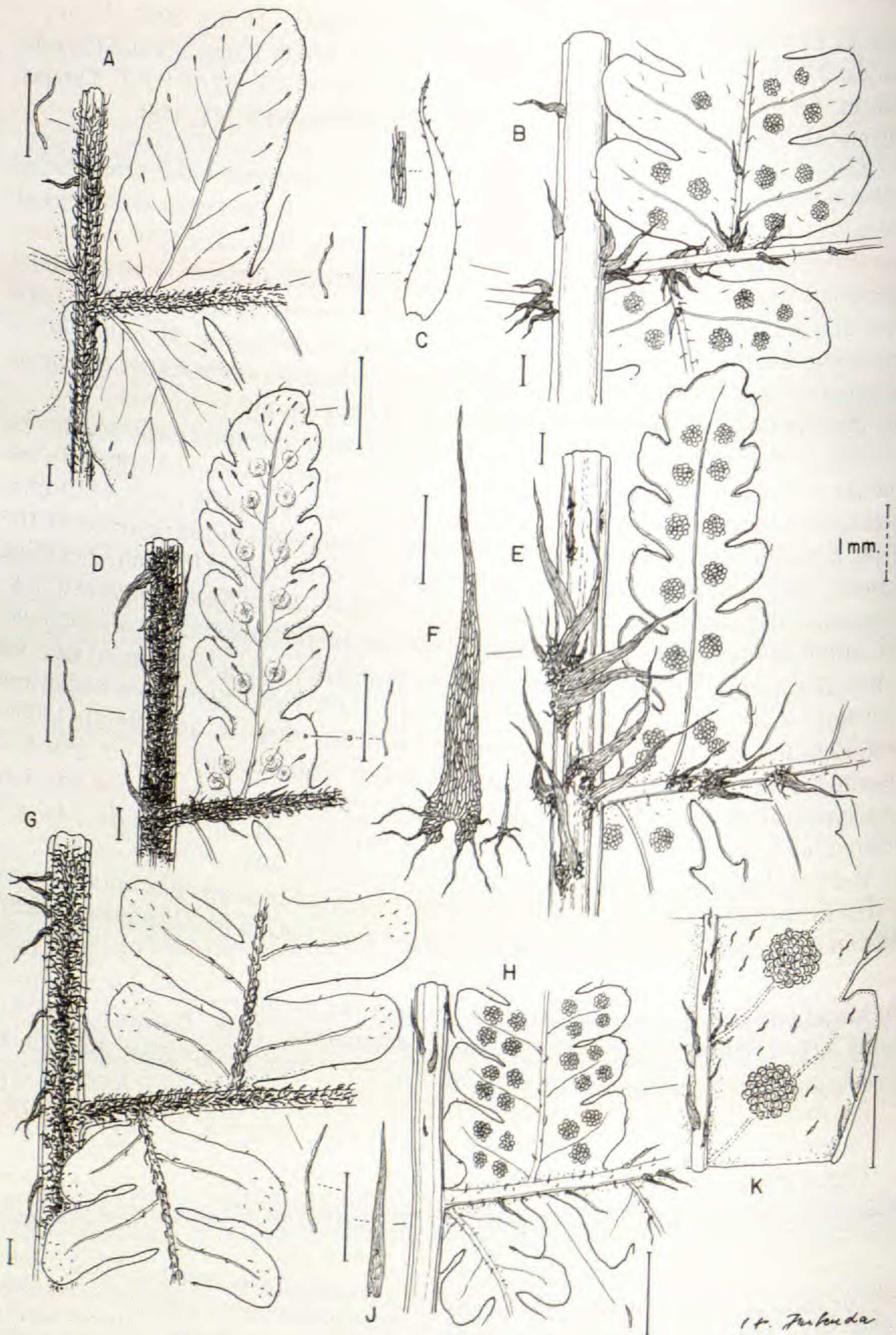
For *Dryopteris villosula* var. *inaequalis*, here listed in synonymy, we designate a lectotype here because Gilbert (1897) did not cite a herbarium and Christensen cited only syntypes (B, US). Kessler and Smith (2006) reported a holotype and isotypes: but these designations are not effective lectotypification because they did not say "here designated," nor are they inferential lectotypification according to Article 7.10 of the Code (McNeill et al. 2012) because the publication appeared after 2001.

The lectotype designated by Stolze (1991) for *Nephrodium villosum* var. *opaca* Hieron. is superfluous because of the earlier designation by Christensen (1920).

5. ***Megalastrum aureisquama*** M. Kessler & A. R. Sm., Amer. Fern J. 96:37, fig. 1H–K. 2006. TYPE.—BOLIVIA. Cochabamba: Prov. Carrasco, 137 Km antigua carretera Cochabamba-Villa Tunari, 17°06'S, 65°35'W, 1600 m, 18 Jul 1996, M. Kessler, T. Krömer, J. Gonzales, B. Hibbits & I. Jiménez 7379 (holotype: UC! [barcode 1614951, 1614952]; isotypes: GOET!, LPB-n.v.). **Figs. 12G–K, 13C, 14A.**

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and pinnules. N. Abaxial surface of rachis showing puberulence. O. Hairs on abaxial surface of pinna rachis. P. Sorus, note glands on indusium. Q. Stipitate glands. R. Abaxial surface of rachis. S. Abaxial surface of pinnule. T. Hairs on pinna rachis. U–D'. *M. andicola*. U. Abaxial surface of rachis and pinnule. V. Stipitate glands on rachis. W. Detail of indument. X. Sorus, note glandular indusium. Y. Hair from indusium. Z. Stipitate glands from abaxial surface between veins. A'. Adaxial surface of rachis and pinnules. B'. Adaxial surface of rachis. C'. Indument detail. D'. Hairs. E'. Glands. All scale bars = 1 mm. A–L: from Brazil, Jürgens s.n. [Rosenstock Filices Austrobrasilienses no. 206] (UC). M–T: Mejia et al. 3517 (NY). U–D': Kessler et al. 6379 (UC).



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FIG. 12. Indument of three species of Andean *Megalastrum*. A-C. *M. rupicola*. A. Adaxial surface of pinna rachis, costule, pinnules. B. Abaxial surface of pinna rachis, costule, pinnules. C. Rachis scale. D-F. *M. squamosissimum*. D. Adaxial surface of pinna rachis, costule, and pinnules. E. Abaxial surface of pinna rachis, costule, and pinnules. F. Rachis scale. G-K. *M. aureisquama*. G.

Rhizomes erect, scales 5.0–15.0 × 0.5–1.2 mm, ascending to appressed, lanceolate, dark brown, lustrous to dull, flat to twisted, denticulate; **leaves** 1.0–2.0 m long; **petiole base scales** like those of the rhizomes but spreading to loosely ascending; **laminae** 0.4–1.0 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect; **lamina rachises** without hairs abaxially; **basal pinnae** 30.0–50.0 cm long, inequilateral, elongated basiscopically; **pinna rachises** abaxially eglandular, without hairs or rarely pubescent distally, scaly, the hairs (when present) 0.2–0.8 mm long, 2- or 3(–6)-celled, appressed to erect, acicular, the scales 3.0–5.0 × 0.3–0.5 mm, entire or nearly so, golden brown, flat, lax, not clathrate, not bullate, adaxially densely pubescent, sparsely scaly, the hairs 0.8–1.5 mm long, 5–8-celled, the scales like those of the pinna rachises abaxially; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, glabrous to sparsely pubescent, scaly, the hairs like those of the pinna rachises, the scales 0.8–2.0 × ca. 0.3 mm, like those of the pinna rachises, adaxially pubescent, scales absent, the hairs 0.8–1.5 mm long, 5–8-celled abaxially; **laminar tissue between veins** on both surfaces eglandular, glabrous; **ultimate veins** visible on both surfaces, abaxially eglandular, glabrous to rarely sparsely pubescent, the hairs 0.2–0.3 mm long, 1- or 2-celled, like those on the pinna rachises abaxially, adaxially eglandular, sparsely pubescent mostly on the distal veins, the hairs 0.3–0.5 mm long, 1–3-celled; **lamina margins** eglandular, sparsely ciliate, the hairs 0.1–0.3 mm long, 2- or 3-celled, acicular, substrigose, ascending; **indusia** absent; **spores** cristate.

Distribution and ecology.—Peru, Bolivia; 1300–2900 m.

SELECTED SPECIMENS EXAMINED.—PERU. **Cusco:** Distr. Sta. Ana, Tunquimayo, 2200 m, 12°54'31"S, 72°48'45"W, 27 Sep 2004, *Calatayud et al.* 2911 (MO, NY); La Convención, above Qillouno, 2300 m, 12°28'35"S, 72°29'15"W, 29 Apr 2006, *van der Werff et al.* 21125 (MO); idem, Distr. Sta. Ana, Poromate, 2118 m, 12°55'S, 72°47'W, 13 Jun 2003, *Calatayud et al.* 1401 (MO). **Junín:** Chancamayo, Río Rondayacu, 45 km from San Ramón, 1880–1950 m, 11°20'S, 72°20'W, 15 Oct 1982, *Smith et al.* 2615 p.p. (MO).

BOLIVIA. Cochabamba: José Carrasco Torrico, 113 km antigua carretera a Cochabamba-Villa Tunari, 2900 m, 17°07'S, 65°38'W, 3 Jul 1996, *Kessler et al.* 6908 (UC).

Among the large decomposed species of the genus, *Megalastrum aureisquamata* is distinctive by its pinna rachises abaxially without hairs and pinna rachis scales that are linear, straightish, ascending, golden brown, and entire or nearly so. This species resembles *M. subincisum* from northern Venezuela and Colombia and can be distinguished morphologically by dark brown, shorter

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Adaxial surface of pinna rachis, costule, pinnules. H. Abaxial surface of pinna rachis, costule, pinnules. J. Rachis scale. K. Detail of costule and pinnule lobes. Scale bars = 1 mm. A–C: Holotype, *Quintana et al.* 41 (UC). D–F: Isotype *Spruce* 5262 (NY). G–K: *Calatayud et al.* 1401 (MO).



FIG. 13. Leaf dissection in seven species of Andean *Megalastrum*. A. Proximal part of basal pinna, *M. praetermissum*. B. Proximal part of basal pinna, *M. tepuiense*. C. Basal pinnae, *M. aureisquama*. D. Basal pinna, *M. subtile*. E. Basal pinnae, *M. rupicola*. F. Basal pinna, *M. martinicense*. G. Basal pinna, *M. oellgaardii*. A: Fay & Fay 4232 (MO). B: Holotype, Steyermark 85913 (VEN). C: van der Werff et al. 21125 (MO). D: Moran 7608 (NY). E: Kessler et al. 9900 (UC). F: West Indies, Morton 6000 (NY). G: Holotype, Øllgaard et al. 2219 (AAU).

(5.0–15.0 mm long) rhizome scales (vs. 20–25 mm long, golden brown in *M. subincisum*) and ultimate veins sparsely pubescent, especially distally (vs. glabrous in *M. subincisum*). In Bolivia, similar is *M. marginatum*, but that species differs by the pinna rachis scales shorter (2–4 mm long), darker, and more denticulate.

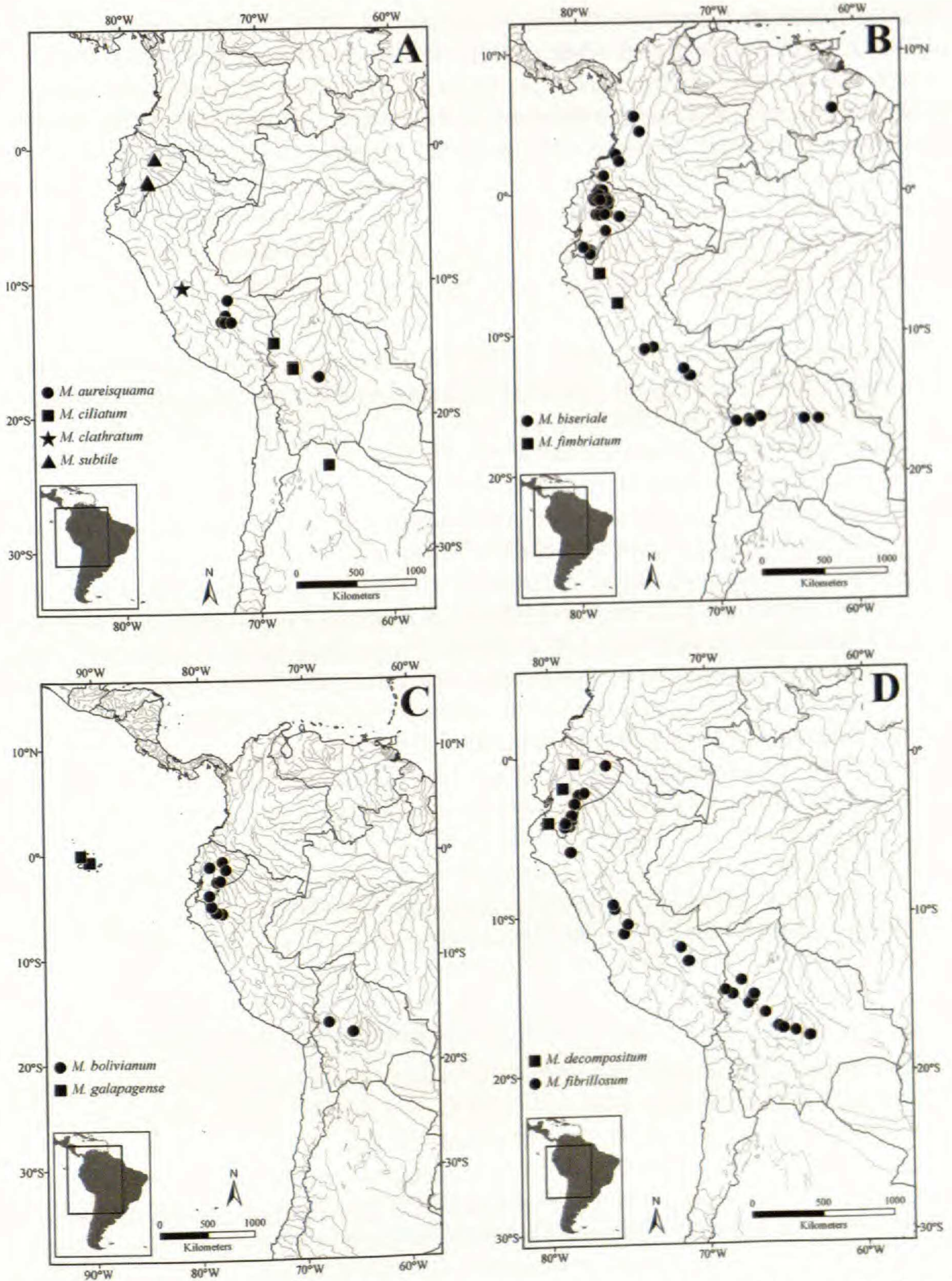


FIG. 14. Distribution of ten species of *Megalastrum* in the Andes. Some species are also known from areas outside the Andean region as here defined; for the worldwide distribution of a species, see under each species description.

6. **Megalastrum biseriale** (Baker) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:127. 1987 [published 3 May 1988]. *Polypodium biseriale* Baker, Syn. Fil. 309. 1867. *Nephrodium biseriale* (Baker) Diels, Nat. Pflanzenfam. 1(4):170. 1899. *Dryopteris biserialis* (Baker) C. Chr., Index Filic. 254. 1905. *Ctenitis biserialis* (Baker) Lellinger, Fern Gaz. 11:108. 1975. TYPE.—ECUADOR. Tungurahua. Mt. Tungurahua, s.d., R. Spruce s.n. (lectotype, designated by Moran and Prado, 2010: K! [barcode 000200146]; isolectotypes, K! [barcode 000200146, 000227603]). **Figs. 2C, 14B, 15F–K, 16B–D.**

Ctenitis bidecorata Lellinger, Proc. Biol. Soc. Wash. 98:373, fig. 5. 1985.

Megalastrum bidecoratum (Lellinger) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:127. 1987 [1988]. TYPE.—COSTA RICA. Cartago: Estrella-Sta. María road, [9°47'N 83°58'W], 230 m, 21 Apr 1928, H. Stork 1518 (holotype: US-n.v.; photo CR! ex US).

Dryopteris wolfii Hieron., Hedwigia 46:344, tab. 7, fig. 17. 1907. TYPE.—ECUADOR. Tungurahua: Baños-Pintuc, [1°23'S, 78°25'W], s.d., M. A. Stübel 998 (lectotype, here designated: B! [barcode 20 0052936]; isolectotype: BM! [barcode 000907720]).

Dryopteris yungensis Christ & Rosenst., Repert. Spec. Nov. Regni Veg. 5:234. 1908. *Megalastrum yungense* (Christ & Rosenst.) A. R. Sm., Amer. Fern J. 77:129. 1987 [published 3 May 1988]. TYPE.—BOLIVIA. La Paz: Prov. Sud Yungas, Sirupaya near Yanacachi, [16°00'S, 65°05'W], 2000 m, 16 Nov 1906, O. Buchtien 419 (lectotype, designated by Tryon and Stolze (1991): P! [barcode 000600636]; isolectotype: US-n.v.).

Megalastrum aequatoriense A. Rojas, Mét. Ecol. Sist. 3(Supl. 1):41, fig. 1A, B. 2008. TYPE.—ECUADOR. Carchi: Trail to Pailon encampment, Gualpi Chico area of Awá Reserve, 0°58'N, 78°16'W, 1350–1400 m, 21 Jan 1988, W. S. Hoover, A. Arquello, P. Gelpi & R. A. Lorentzen 3609 (holotype: MO! [barcode 3710680]; isotype: UC! [barcode 1564580]).

Nephrodium subglabrum Sodiro, Crypt. Vasc. Quit. 259. 1893. TYPE.—ECUADOR. Pichincha: “in silva prope San Nicolás,” [0°19'S, 78°27'W], 1200 m, Oct 1891, A. Sodiro s.n. (lectotype, here designated: P! [barcode 000568196]; isolectotypes: P! [barcode 000600391], QPLS?-n.v., Q?-n.v.).

Rhizomes erect, scales 7.0–17.0 × ca. 1 mm long, appressed to ascending, linear-lanceolate, brown, lustrous, twisted, sparsely denticulate, the teeth simple or bifid; **leaves** 0.6–1.2 m long; **petiole base scales** ca. 10.0 × 1.0 mm, like those of the rhizomes but often spreading and more sparsely denticulate; **laminae** 0.5–0.9 m long, basally 2-pinnate to 2-pinnate-pinnatifid, medially 1- to 2-pinnate-pinnatifid; **lamina rachises** pubescent abaxially; **basal pinnae** 10.0–15.0(–23.0) cm long, equilateral to subequilateral; **pinna rachises** abaxially eglandular, pubescent, scaly, the hairs 0.2–0.3(–0.4) mm long, 2- or 3-celled, strigose or appressed to ascending, the scales 2.0–5.0 × 0.2–0.5 mm, brown, lanceolate, lustrous, appressed to spreading, twisted (but not tortuous), sparsely denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, non-scaly, the hairs 0.4–0.6 mm long, 4- or 5-celled, acicular, ascending to strigose, light brown; **basal basisopic pinnules of medial pinnae**

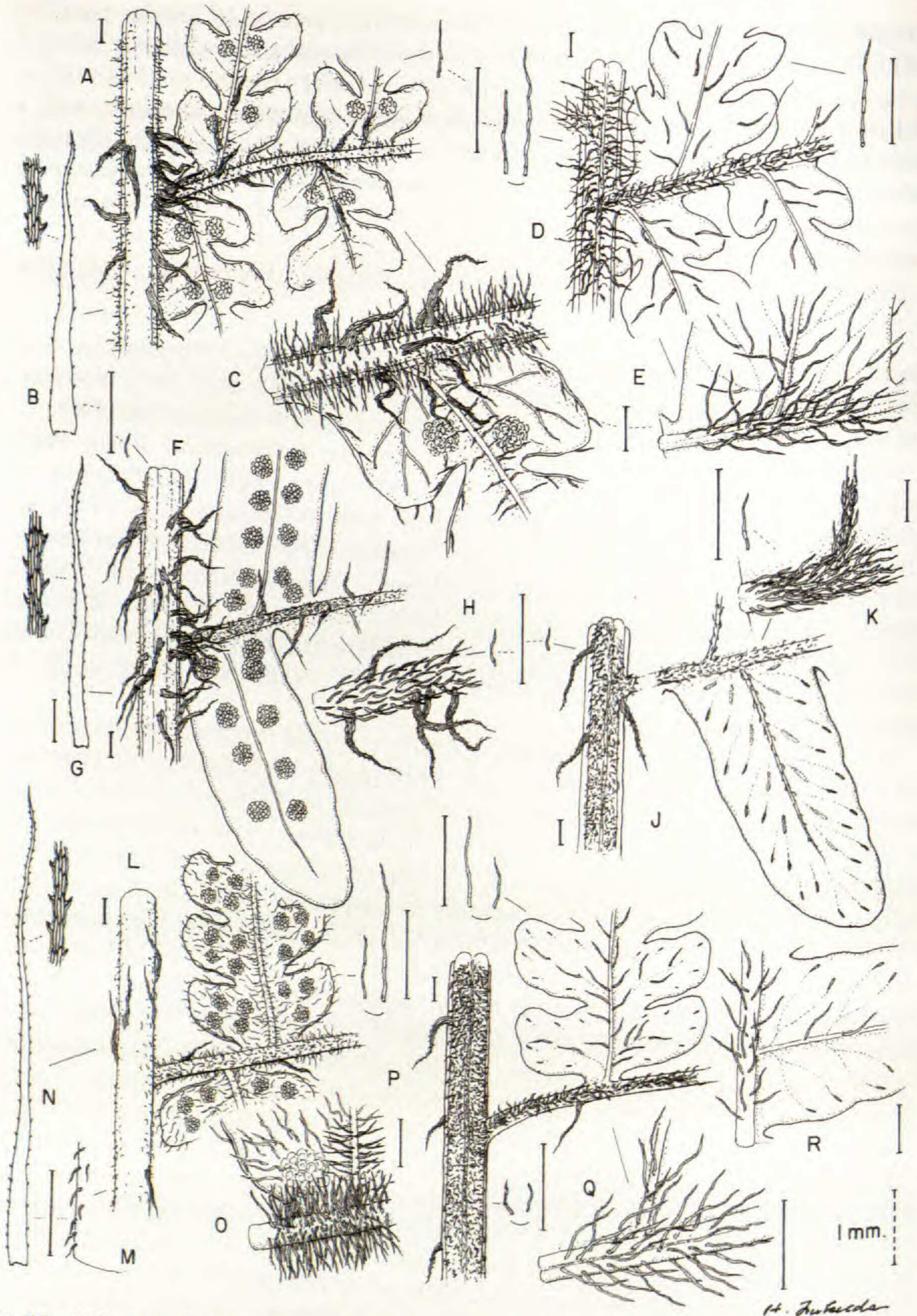
not enlarged or overlapping the lamina rachis, crenate to lobate; **costules** abaxially eglandular, sparsely pubescent, sparsely scaly, the scales ca. 0.8–1.0 × ca. 0.1 mm, adaxially sparsely pubescent, the hairs like those of the pinna rachises adaxially; **laminar tissue between veins** eglandular, abaxially with a few appressed proscas, without hairs on both sides of the lamina; **ultimate veins** evident and glabrous on both surfaces; **lamina margins** eglandular, very sparsely ciliate, the hairs 0.1–0.2 mm long, 1- or 2-celled, acicular, appressed; **indusia** absent; **spores** cristate.

Distribution and ecology.—Costa Rica, Panama, Venezuela, Colombia, Ecuador, Peru, Bolivia; 1000–2300(–3050) m.

SELECTED SPECIMENS EXAMINED.—VENEZUELA. **Bolívar**: Cerro Uananapan, S of Uei-tepui, kms from campamento 132, between Luepa and Cerro Venamo, 1450 m, [5°55'N, 61°25'W], 25 Apr 1960, *Steyermark & Nilsson* 762 (NY).

COLOMBIA. **Antioquia**: Mpio. Jardín, vereda La Mesenia, sector Paramillo, 2280–2560 m, 5°29'13"N, 75°53'52"W, 9 Jan 2005, *Rodríguez et al.* 4934 (NY). **Cauca**: La Gallera, Micay Valley, 1400–1500 m, 3°02'N, 77°32'W, 29–30 Jun 1922, *Killip* 7758 (AAU). **Nariño**: Municipalidad Barbacoas, Corregimiento Altaquer, Vereda El Barrio, Reserva Natural El Ñambí, vertiente occidental andina, 1325 m, 1°18'N, 78°08'W, 6 Dec 1993, *Betancur et al.* 4663 (COL). **Tolima**: Along Quindío Highway, between Cajamarca and summit of Divide, 3275 m, [4°25'N, 75°30'W], 27–28 Mar 1939, *Killip & Varela* 34671 (BM).

ECUADOR. **Carchi**: Mira Cantón, camino a Chical, 2000–2200 m, 0°17'N, 78°13'W, 10 Feb 1992, *Palacios et al.* 9724 (AAU, MO, QCNE). **El Oro**: Río Palma, a tributary to Río Amarillo, near Pampa de los Cedros S of Cerro Chivo-Turco, 2135–2285 m, 3°45'S, 79°40'W, 11 Aug 1943, *Steyermark* 53768 (F). **Loja**: Parque Nacional Podocarpus, E of Nudo de Cajanuma, trail E of Centro de Información to crest on trail to Lagunas de Compadre, 2850–3050 m, 4°05'S, 79°10'W, 7 Jun 1988, *Øllgaard* 74637 (AAU, QCA, QCNE). **Morona-Santiago**: road Plan de Milagro-Gualaceo, Km 3, 1900 m, 3°00'S, 78°30'W, 16 Nov 1998, *Navarrete & Øllgaard* 3047 (AAU, QCA). **Napo**: camino Oyachachi-el Chaco, sector Río Chalpi, 2500 m, 0°13'S, 77°58'W, 23 May 1996, *Navarrete* 1684 (AAU); near Cosanga, Yanayacu Biological Station, 2100 m, 0°35'57"S, 77°53'26"W, 12 Feb 2005, *Moran* 7443 (NY, QCA, QCNE). **Pastaza**: Fundo chela, Sinchono, 1100 m, 1°27'S, 78°06'W, 5–19 Mar 1985, *Baker et al.* 5772 (MO, NY, QCNE). **Pichincha**: Maquipucuna Biological Field Station, ca. 5 km E of Nanegalito and ca. 25 km N of Quito, 1400–1700 m, 0°08'N, 78°35'W, 2 Feb 1991, *Moran & Rohrbach* 5229 (AAU, MO); Mindo, San Toledo, 1300 m, [0°10'S, 78°38'W], s.d., *Stübel* 770 (B); road Chillogallo-Santo Domingo, below Chrigoga, 14 km from the new road, 1500 m, 0°19'S, 78°52'W, 13 Aug 1980, *Holm-Nielsen et al.* 24853 (AAU, NY). **Tungurahua**: Palmera, Río Pastaza, between Baños and Mera, 1300 m, [1°23'S, 78°03'W], 1924, *Tate* 653 (NY). **Zamora-Chinchi**: Parque Nacional Podocarpus, around pass on road Loja-Zamora, on old mule track toward Zamora, 2800–3000 m, 3°59'S, 79°07'W, 8 Mar 1990, *Madsen* 87002 (AAU, QCA).



H. J. ...

FIG. 15. Indument of three species of Andean *Megalastrum*. A-E. *M. fimbriatum*. A. Abaxial surface of leaf rachis, pinna rachis, and pinnules. B. Rachis scale, with enlarged detail of scale tip. C. Detail of abaxial surface of costule and segments. D. Adaxial surface of pinna rachis, costule, and segments. E. Detail of hairs on costule and segments. F-K. *M. biseriale*. F. Abaxial of leaf rachis, pinna rachis, and pinnules. G. Rachis scale, with enlarged detail of scale tip. H. Detail of costule. J.

PERU. **Cusco**: Distr. Huayopata, Huyro, Calquiña, 1750 m, 12°58'51"S, 72°03'31"W, 27 Jun 2003, *Bonino et al.* 751 (MO). **Junín**: Pichis Trail, San Nicolas, 1100 m, 4–5 Jul 1929, *Killip & Smith* 26021 (NY, US).

BOLIVIA. **La Paz**: Prov. Nor Yungas, carretera Chuspipata-Yolosa, sobre el tramo puente Loza y Sacramento, 2850 m, 16°17'S, 68°48'W, 28 Apr 2004, *Jiménez* 2177 (NY, UC); idem, 19.8 km from Yolosa toward Chuspipata, 2280 m, 16°15'S, 67°45'W, 27 Jun 1989, *Fay & Fay* 2205 (MO, UC, US).

Megalastrum biseriale is characterized by laminae 2-pinnate to 2-pinnate-pinnatisect, tissue between the veins on both surfaces glabrous, and pinna rachises abaxially pubescent. A specimen from Sucre, Venezuela (*Steyermark* 62438 *p.p.*) is atypical by the much longer hairs (0.6–1.4 mm long) on both surfaces of the laminae. In other characters, such as size and cutting of the laminae, it resembles *M. biseriale*. We have annotated the specimen as “aff. *biseriale*.” Further research might show it to be a new species.

We previously placed *Megalastrum biseriale* in synonymy with *M. macrotheca*, which has a type from Guadeloupe (Moran *et al.* 2009b; Moran and Prado 2010). After examining the larger number of South American specimens available to us since then, we believe that *M. biseriale* is distinct—a conclusion also supported by our unpublished plastid DNA sequence results (in preparation). Although similar, *M. macrotheca* differs by pinna rachises abaxially usually less pubescent with longer hairs (0.3–1.2 mm) composed of more cells (3–5-celled). The specimens from the Antilles tend to have more numerous and wider scales along the rachises of the laminae and costae.

The lectotype of this species was previously cited incorrectly as *Spruce* 4656 (Moran & Prado, 2010), a specimen that is the type of *Megalastrum platylobum* (see below). In fact, the K barcodes cited as the lectotype are for a collection without a number and should be cited as *Spruce s.n.*

7. *Megalastrum bolivianum* M. Kessler & A. R. Sm., Amer. Fern. J. 96:33, fig. 1D–F. 2006. TYPE.—BOLIVIA. Cochabamba: Prov. Carrasco, 143 Km antigua carretera Cochabamba-Villa Tunari, 17°07'S, 65°34'W, 1300 m, 23 Aug 1996, *M. Kessler* 7630a (holotype: UC! [barcode 1616953]; isotypes: GOET!, LPB-n.v.). **Figs. 14C, 16E, 17A–D.**

Rhizomes erect, scales 6.0–10.0 × 0.5–1.0 mm, appressed to ascending, linear-lanceolate, brown to light brown, lustrous, denticulate, the surfaces smooth (not setulose); **leaves** up to ca. 0.8 m long; **petiole base scales** like those

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Adaxial of leaf rachis, pinna rachis, and pinnules. K. Adaxial surface of pinna rachis and costule. L–R. *M. ciliatum*. L. Abaxial surface of leaf rachis, pinna rachis, and pinnules. M. Rachis hairs. N. Rachis scale, with enlarged detail of scale tip. O. Detail of abaxial surface. P. Adaxial surface of leaf rachis, pinna rachis, and pinnules. Q. Hairs along pinna rachis and costule. R. Adaxial surface of costule and segment. Scale bars = 1 mm. A–E: Holotype, *Young & León* 4958 (F). F–K: *Stübel* 770 (B). L–R: *Fuentes et al.* 9013 (MO).

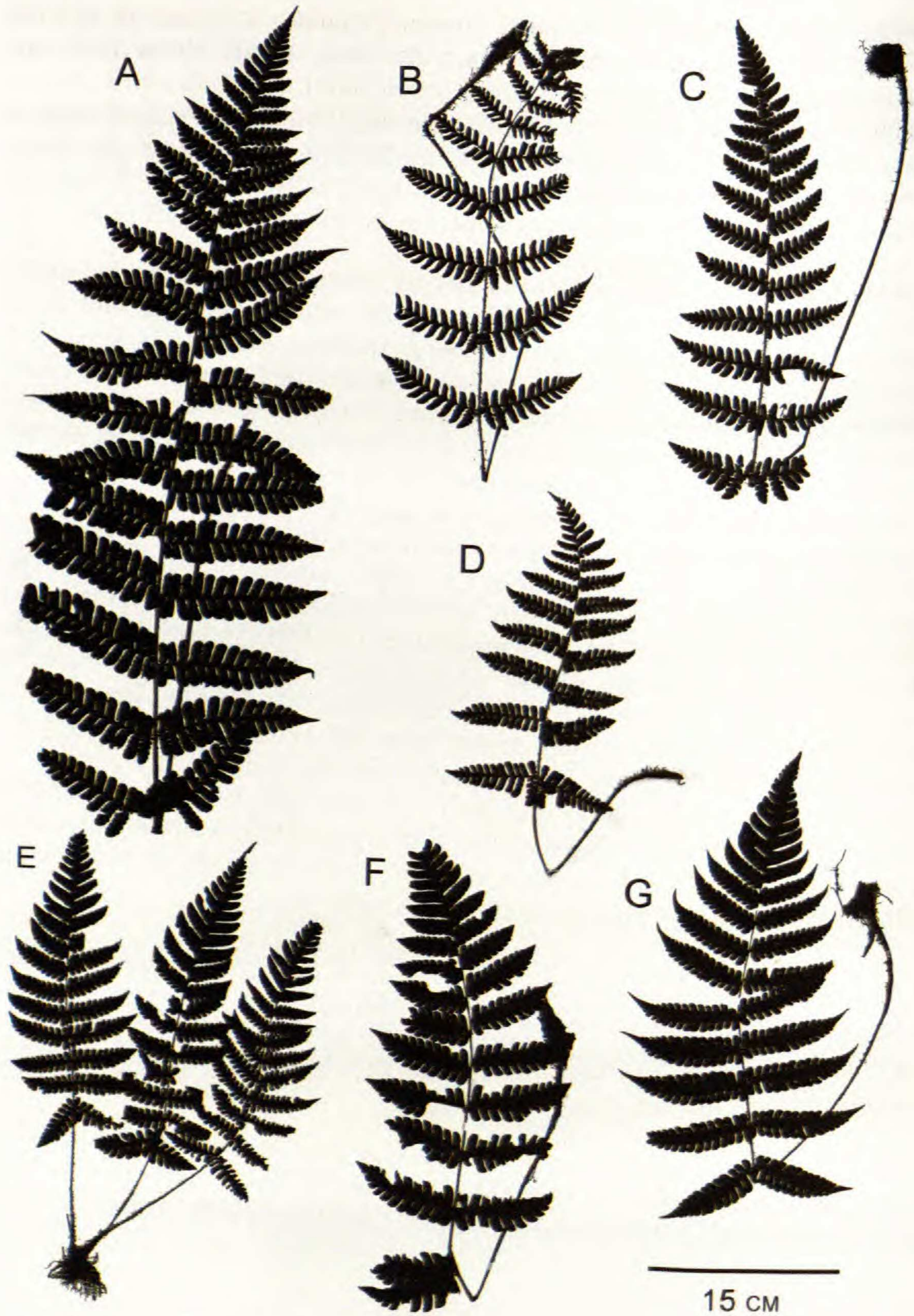


FIG. 16. Leaf dissection of five 1-pinnate-pinnatifid species of Andean *Megalastrum*. A. *M. platylobum*. B. *M. biseriale*. C. *M. biseriale*. D. *M. biseriale*. E. *M. bolivianum*. F. *M. ctenitoides*. G. *M. fibrillosum*. A: Lectotype, Spruce 4656 (K). B: Moran & Rohrbach 5229 (MO). C: Navarrete 1684 (AAU). D: Fay & Fay 2205 (MO). E: Holotype, Kessler 7630a (UC). F: Øllgaard et al. 2205 (AAU). G: Øllgaard 2859 (AAU).

of the rhizomes; **laminae** 0.25–0.5 m long, basally 2-pinnate-pinnatifid, medially 1-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** 3.5–12.0 cm long, equilateral or subequilateral; **pinna rachises** abaxially eglandular, sparsely pubescent, scaly, the hairs 0.5–1.2 mm long, 4- or 5-celled, spreading, lax, the scales 0.5–1.0 × 0.2–0.3 mm, dark brown, spreading, narrowly lanceolate, sparsely denticulate, not clathrate, not bullate, adaxially eglandular, sparsely pubescent, scales absent, the hairs 1.0–1.5 mm long, 5–9-celled, ascending, light brown to whitish; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** on both surfaces with indument like that of the pinna rachises; **laminar tissue between veins** abaxially eglandular, glabrous, adaxially glabrous; **veins** visible on both surfaces, abaxially subglabrous, with few hairs towards the apex, adaxially sparsely puberulent, the hairs like those on the costules; **lamina margins** eglandular, ciliate, the hairs ca. 0.3 mm long, 2- or 1-celled, substrigose; **indusia** absent; **spores** cristate.

Distribution.—Ecuador, Peru, Bolivia; eastern side of the Andes, on soil or rarely on rocks; 600–2800 m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Bolívar:** Carretera Salinas-Facundo Vela, 2800 m, 1°15'S, 79°02'W, Sep 1994, *Navarrete 725* (AAU). **Morona-Santiago:** along new road Mendez-Morona, Km 55–62, 800 m, [2°40'S, 78°19'W], 23 Aug 1989, *van der Werff & Gudiño 11369* (F, MO, NY). **Napo:** camino entre Baeza y Tena, 15 km al N de Tena, 1100 m, [0°59'S, 77°49'W], 24 Jan 1984, *Moran 3583* (AAU). **Pastaza:** Km 17 del propuesto oleoducto ARCO-Villano-El Triunfo, 600 m, 01°31'S, 77°30'W, 25 Feb 1994, *Palacios 12113* (MO, QCNE). **Zamora-Chinchipec:** new road Loja to Zamora, 13 km E of the Pass, 2000 m, 4°00'S, 79°02'W, 14 Feb 1991, *Moran & Rohrbach 5382* (AAU, MO, QCNE).

PERU. **Amazonas:** Bagua, 12 km E of La Peca, 1700 m, [5°36'S, 78°26'W], 23 Jun 1978, *Barbour 2499* (MO). **Cajamarca:** San Ignacio, San José de Lourdes, Buenos Aires, Cerro El Paco, 1900 m, 5°42'04"S, 77°53'06"W, Feb 2002, *Bonino 143* (MO).

BOLIVIA. **La Paz:** Nor Yungas, Canton Pacollo a 500 m de la Estación Biológica Tunquini, subiendo el Río Santa Catalina, 1690 m, 16°11'15"S, 67°52'3", 23 Aug 1998, *Portugal et al. 246* (UC).

Megalastrum bolivianum is distinguished by short leaves (to 0.8 m long), laminae medially 1-pinnate-pinnatisect, and pinnae rachises abaxially with long (0.5–1.2 mm) whitish hairs. Similar is *M. molle*, which differs by minute glandular pubescence between the veins on both surfaces of the laminae (vs. eglandular). Also similar because of their laminae 1-pinnate-pinnatisect medially are *M. fibrillosum* and *M. platylobum*. The first differs from *M. bolivianum* by filiform scales of the pinna rachises abaxially and lacking hairs adaxially along the veins. The second species differs from *M. bolivianum* by shorter hairs (0.1–0.4 vs. 0.5–1.2 mm long) along the pinna rachises abaxially and veins adaxially glabrous (vs. pubescent).

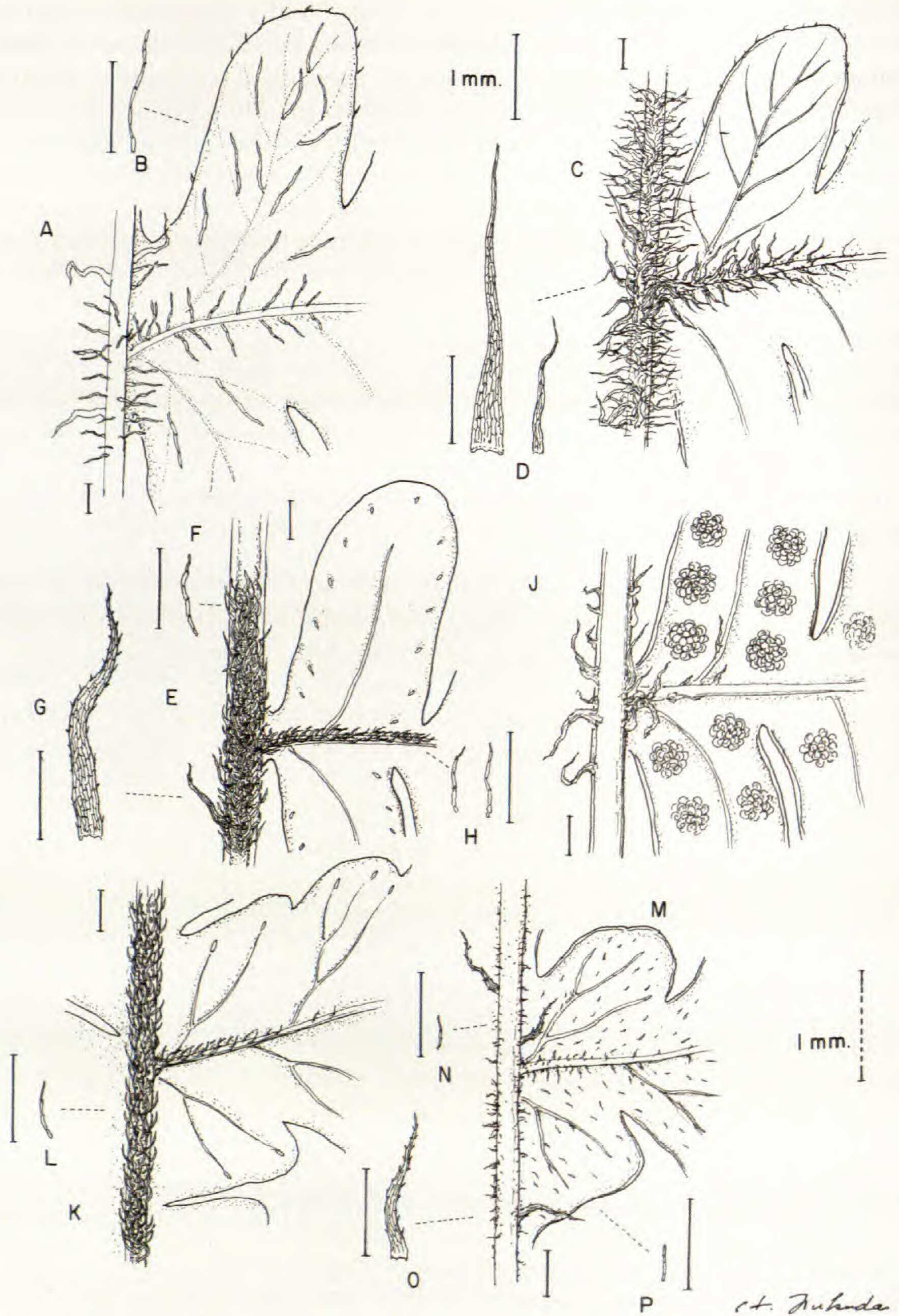


FIG. 17. Indument of three species of Andean *Megalastrum*. A–D. *M. bolivianum*. A. Adaxial surface of lamina rachis and segments. B. Hair detail. C. Abaxial surface of lamina rachis and segments. D. Scale detail. E–J. *M. oellgaardii*. E. Adaxial surface of pinna rachis and segments. F. Hair detail. G. Scale detail. H. Hair detail. J. Abaxial surface of pinna rachis and segments. K–P. *M. oreophilum*. K. Adaxial surface of pinna rachis and segments. L. Hair detail. M. Abaxial surface of

One specimen we have identified as *Megalastrum bolivianum* (Øllgaard et al. 90906, AAU) is atypical by subdimorphic sterile and fertile leaves, veins glabrous adaxially, and pinna rachises abaxially with ovate scales. It might be new, but we refrain from describing it on the basis of this one specimen.

8. ***Megalastrum ciliatum*** M. Kessler & A. R. Sm., Amer. Fern J. 96:38. 2006.
 TYPE.—BOLIVIA. La Paz: Prov. Sud Yungas, camino Chulumani–Ocobaya, 2.5 km después de Chulumani, 16°23'S, 67°31'W, 1600 m, 6 Jan 1992, J. P. Schmit, T. Mione & W. Zuazo 422 (holotype: UC! [barcode 1616956]; isotype: LPB-n.v.). **Figs. 14A, 15L–R, 18B.**

Rhizomes erect, scales 6.0–10.0 × 1.0–1.5 mm, spreading to ascending, linear-lanceolate, brown with margins black-bordered (at least intermittently), lustrous, twisted, strongly denticulate; **leaves** 0.5–0.8 m long; **petiole base scales** like those of the rhizomes but more spreading to loosely ascending; **laminae** 0.4–0.7 m long, basally 3-pinnate-pinnatifid, medially 2-pinnate-pinnatisect; **lamina rachises** without hairs abaxially; **basal pinnae** 10.0–30.0 cm long, inequilateral; **pinna rachises** abaxially eglandular, pubescent, sparsely scaly, hairs 0.8–1.5 mm long, 4–7-celled, spreading, acicular, the scales 1.0–2.0 × 0.2–0.3 mm long, light to dark brown, sometimes darker distally, linear-lanceolate, strongly denticulate, not clathrate, not bullate, adaxially sparsely glandular, densely pubescent, scales absent, the glands ca. 0.1 mm long, spherical, sessile, orange to yellowish, the hairs 1.0–1.5 mm long, 6–8-celled, appressed to spreading; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** one both surfaces eglandular, densely pubescent, sparsely scaly, the hairs 0.7–1.0 mm long, 3–6-celled, spreading, the scales to 1.5 × 0.2 mm, loosely ascending, brown, linear-lanceolate, lustrous, strongly denticulate; **laminar tissue between veins** abaxially sparsely glandular, moderately to densely puberulent, the glands ca. 0.1 mm long, spherical, sessile, orange to yellowish, the hairs 0.8–1.0 mm long, 4–6-celled, appressed to erect, acicular, adaxially glabrous; **veins** on both surfaces visible or sometimes obscure adaxially, pubescent, abaxially with hairs like that between the veins, adaxially with hairs 0.5–1.0 mm long, 3–6-celled, straightish or somewhat tortuous; **lamina margins** eglandular, ciliate, the hairs 0.4–1.0 mm long, 2–6-celled, ascending to spreading; **indusia** absent; **spores** cristate.

Distribution.—Bolivia, northern Argentina; 1600–1830 m.

SELECTED SPECIMENS EXAMINED.—BOLIVIA. **La Paz:** Parque Nacional Madidi, entre Carjata y Río Yana Lomas, 1700 m, 14°34'12"S, 68°54'00"W, 28 Jun 2005, Fuentes et al. 9013 (MO, UC).

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pinna rachis and segment. N. Hair detail. O. Scale detail. P. Hair detail. Scale bars = 1 mm. A–D: Holotype, Kessler et al. 7630a (UC). E–J: Holotype, Øllgaard et al. 2219 (AAU). K–P: Isotype, Maguire et al. 36871 (US).

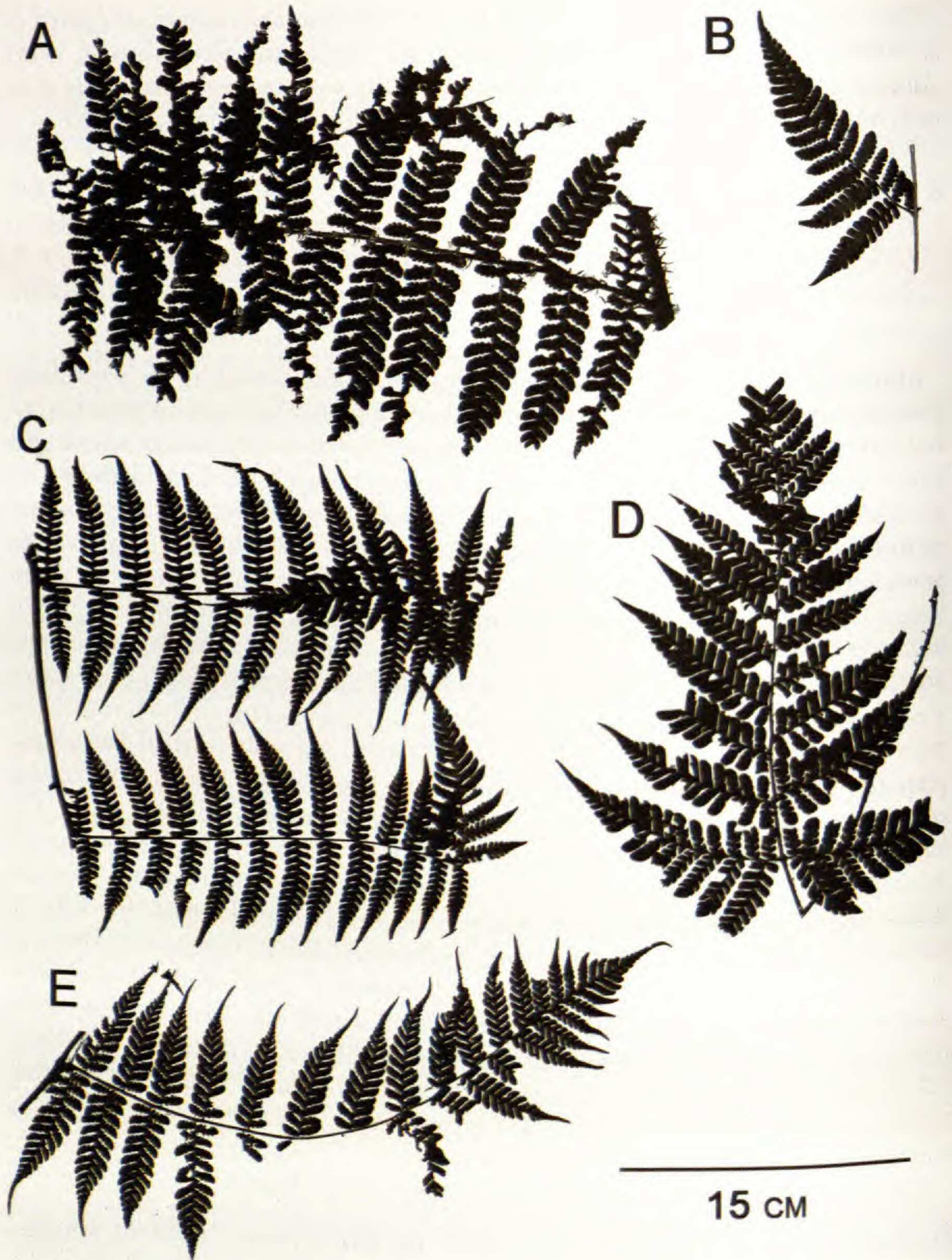


FIG. 18. Leaf dissection in five species of Andean *Megalastrum*. A. Medial pinna, *M. squamosissimum*. B. Basal pinna, *M. ciliatum*. C. Medial pinnae, *M. subincisum*. D. Leaf, *M. pubescens*. E. Medial pinna, *M. pubirhachis*. A: Barrington 461 (GH). B: Fuentes et al. 9013 (UC). C: Rodríguez et al. 5629 (NY). D: Rodríguez et al. 5559 (COL). E: Isotype, Fay & Fay 3919 (NY).

ARGENTINA. **Jujuy**: Depto. Ledesma, Parque Nacional Calilegua, Aguada del Tigre, 1600 m, 23°41'S, 64°53'W, 7 Apr 2010, *Martínez & Prado 1893* (MCSN, NY, SP).

Megalastrum ciliatum is characterized by relatively small leaves (up to 0.8 m long). Besides size, the species is further distinctive by veins adaxially with straightish hairs 0.5–1.0 mm long, laminar tissue abaxially pubescent with hairs 0.8–1.0 mm long, and pinna rachises and costules abaxially with strongly denticulate scales.

This species most resembles *Megalastrum nigromarginatum* from Colombia. Both have similar lamina size and cutting, and the rhizome scales are intermittently black-margined—a rare character in the genus. The two species can be distinguished by characters given in the key. *Megalastrum ciliatum* also resembles *M. marginatum* and *M. rupicola* by lamina size and cutting but differs by the laminae between the veins abaxially pubescent. The densely pubescent laminae may resemble that of *M. pulverulentum*, but that species differs by much larger leaves (to 4 m long), the presence of glands, pinna rachis scales more strongly denticulate and often darkened apically, and echinulate spores.

See *Megalastrum nanum* for comparison to that species.

9. *Megalastrum clathratum* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.—PERU. Pasco: Prov. Oxapampa, along trail Milpo to Sta. Barbara, cloud forest and puna vegetation, on rich soil, 10°22'53S, 75°38'15"W, 3100–3500 m, 3 Nov 2009, *H. van der Werff, R. Vásquez M., A. Peña, L. Mateo & R. Rivera 23175* (holotype: HOXA! [accession 043231]; isotype: MO! [barcode 6315956, 6315957]). **Figs. 8D, 14A, 19A–F.**

Rhizomes unknown; **leaves** up to 1.5 m long; **petiole base scales** 15.0–20.0 × ca. 0.1 mm, spreading to loosely ascending, linear-lanceolate, brown, twisted, dull, denticulate; **laminae** 0.8–1.0 m long, basally 4-pinnate-pinnatisect, medially 3-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** ca. 0.8 m long, strongly inequilateral; **pinna rachises** on both surfaces sparsely glandular, densely and evenly pubescent, scaly, the glands ca. 0.1 mm long, spherical, sessile, brownish or orangish, the hairs 0.2–0.6 mm long, 3–5-celled, reddish, spreading, the scales clathrate, denticulate to ciliate, sometimes darker apically, non-bullate, reddish, not bullate, of two types, small ones ca. 0.2–0.6 × ca. 0.2 mm long, narrowly lanceolate, spreading, larger 5.0–10.0 × 0.2–0.5 mm long, linear to linear-lanceolate, spreading, adaxially with indument like that abaxially; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially sparsely glandular, the indument like that on the pinna rachises but more sparsely scaly, the scales smaller, 3.0–5.0 × 0.2–0.3 mm long, adaxially sparsely pubescent, the hairs 0.3–0.5 mm long, 3–5-celled, spreading, reddish; **laminar tissue between veins** on both surfaces sparsely glandular, glabrous, the glands ca. 0.1 mm, sessile and spherical, brownish to orangish; **ultimate veins** on both surfaces obscure, abaxially sparsely glandular

and sparsely pubescent, non-scaly, the hairs 0.3–0.5 mm long, 3–5-celled, adaxially eglandular, sparsely pubescent, the hairs 1.0–1.8 mm long, 4–9-celled, spreading; **lamina margins** not glandular, ciliate, the hairs 0.2–0.3 mm long, 2- or 3-celled, spreading; **indusia** absent; **spores** echinulate.

Distribution.—Peru; 3100–3500 m.

SELECTED SPECIMENS EXAMINED.—PERU. **Pasco**: Oxapampa, along trail Milpo to Sta. Barbara, 3100–3500 m, 10°22'53"S, 75°38'15"W, 3 Nov 2009, *van der Werff et al.* 23179 (MO).

Megalastrum clathratum is distinguished by pinna rachis scales clathrate and reddish, and the pinna rachises and costules evenly and densely pubescent by reddish hairs 0.2–0.6 mm long. The species has echinulate spores, a character that will separate it from all other species in the Andes except those in the “pulverulentum clade” (unpublished molecular results). The Andean members of this clade are *M. adenopteris*, *M. fugaceum*, *M. pulverulentum*, and *M. nanum*. The elevational range for this species is the highest in the genus.

- 10. *Megalastrum crenulans*** (Fée) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:127. 1987 [published 3 May 1988]. *Aspidium crenulans* Fée, Crypt. Vasc. Brésil 1:139, t. 47, fig. 1. 1869. *Ctenitis crenulata* (Fée) Ching, Sunyatsenia 5:250. 1940. *Dryopteris crenulans* (Fée) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd., ser. 8, 6:90. 1920. TYPE.—BRAZIL. Rio de Janeiro: Rio de Janeiro, [22°56'S, 43°17'W], s.d., A. Glaziou 1781 (lectotype, designated by Christensen, 1920: C!, photos MICH!, MO!; isolectotypes: K! [barcode 000512192, 000512193], P! [barcode 00610618], P! [barcode 00610619], RB!-n.v.). **Figs. 5C, 6C, 11A–L.**

Dryopteris villosa (L.) Kuntze var. *glandulosa* Rosenst., Hedwigia 46:129. 1907. *Dryopteris crenulans* (Fée) C. Chr. f. *glandulosa* (Rosenst.) C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd., ser. 8, 6:91. 1920. TYPE.—BRAZIL. Rio Grande do Sul: Mun. Rio Pardo, banks of Rio Cyriaco [29°59'22"S, 52°52'41"W], 1906, L. C. Jürgens s.n. [Rosenstock Filices Austrobrasilienses no. 206] (lectotype, designated by Moran *et al.*, 2009a: BM!-000907729; S-n.v.; isolectotypes: B! [barcode 200053756], BM! [barcode 000907728], GH!, HB!, K!, MICH!, MO! [accession 1636088], NY! [barcode 00678829], NY! [barcode 00678938], NY! [barcode 00678937], P! [barcode 00610623], P! [barcode 00610624], P! [barcode 00610625], UC! [barcode 441613], VT! [barcode 001519]).

Rhizomes not seen; **leaves** up to 2.5 m long; **petiole base scales** 10.0–20.0 × 0.2–1.0 mm, en masse forming a dense woolly tuft, linear, light brown, twisted, tortuous, sparsely denticulate; **laminae** ca. 1 m long, basally 4-pinnate, medially 3-pinnate-pinnatifid; **lamina rachises** without hairs abaxially; **basal pinnae** 30.0–57.0 cm long, strongly inequilateral; **pinna rachises** abaxially glandular, pubescent, scaly, the glands ca. 0.1 mm long, 2-celled, stalked,

yellowish, the hairs 0.8–1.2 mm long, 4- or 5-celled, acicular, spreading, the scales ca. 1.0–1.5 mm long, brown, lanceolate, subentire, not clathrate, bullate, adaxially densely pubescent, sparsely glandular, the hairs and glands similar to those of the abaxial side; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially glandular, pubescent, sparsely scaly, the glands ca. 0.1 mm, stalked, 2-celled, yellowish, the hairs 0.2–0.5 mm long, 1–3(4)-celled, acicular, spreading, hyaline, the scales ca. 1 mm long, brown, lanceolate, bullate, shiny, subentire, adaxially sparsely glandular, pubescent, without scales, the glands similar to those abaxially, the hairs 0.4–0.8 mm long, 1–4-celled, erect, acicular; **laminar tissue between veins** abaxially densely glandular and pubescent, the glands stalked, 0.1 mm long, erect, yellowish, the hairs ca. 0.1 mm long, 1-celled, erect, hyaline, acicular, adaxially moderately glandular, sparsely pubescent, indument more dense towards the segment apex, the hairs ca. 0.2 mm long, 2-celled, erect, acicular, the glands similar to those abaxially; **ultimate veins** visible on both surfaces, abaxially very sparsely glandular, pubescent, the hairs 0.2–0.3 mm long, 1- or 2-celled, adaxially sparsely pubescent, the hairs ca. 0.4–0.5 mm long, 1–3-celled; **lamina margins** eglandular, densely ciliate, the hairs ca. 0.3–0.4 mm long, 1- or 2(3)-celled; **indusia** present, 0.8–1.0 mm wide, circular, brown, glandular, the margins with a few 0.1 mm long scattered acicular hairs, sometimes laminar hairs emerging through the sinus of the indusium appear to be part of the indusium proper; **spores** echinulate.

Distribution and ecology.—Venezuela, Brazil, and Paraguay; 1500–1760 m in Venezuela, but to 725 m in Brazil and Paraguay (Moran *et al.*, 2009).

SELECTED SPECIMENS EXAMINED.—VENEZUELA. **Amazonas:** E. Slope of unnamed peak, 8 km NW of settlement of Yutaje, 4 km of Río Corocoro, W of Serranía de Yutaje, ranging from slope below wet bluff to wet bluff to unstable slope to dry bluff summit, 1500–1760 m, 5°41'S, 66°66'W, 4 Mar 1987, *Liesner & Holst* 21585 (MO, NY). **Bolívar:** Faldas del Cerro Apacara, Río Caroni, 1600 m, [5°20'N, 62°12'W], 1 Jul 1946, *Cardona 1590* (US).

Megalastrum crenulans is characterized by indusiate sori and bullate scales on the pinna rachises and costules. The latter character distinguishes the species from the other indusiate ones in South America (i.e., *M. acrosorum*, *M. andicola*, and *M. insigne*). According to our unpublished phylogenetic results, it forms a clade with the Brazilian *M. abundans* and the African-Madagascan *M. lanuginosum* (Willd. ex Kaulf.) Holttum. The clade is defined by blades abaxially with minute yellowish spherical glands, and costae and costules abaxially with bullate scales. *Megalastrum crenulans* differs from *M. abundans* by the presence of an indusium (vs. absent; Moran *et al.* 2009). It differs from *M. lanuginosum* by petiole base scales 0.2–1.0 mm wide (vs. 2.0–3.0), costules abaxially with hairs 0.2–0.5 mm long and 1–3(4)-celled (vs. 0.5–0.7 mm long and 6–8-celled), and indusia 0.8–1.0 mm wide (vs. 1.0–1.5 mm; Rouhan and Moran 2011).

11. *Megalastrum ctenitoides* A. Rojas, *Revista Biol. Trop.* 49:470, fig. 2. 2001.

TYPE.—COSTA RICA: Limón: Cantón Limón, El Progreso, Fila Matama, Valle de La Estrella, cabeceras del Río Cariei, 9°47'20" N, 83°08'18" W, 1400 m, 26 Apr 1989, G. Herrera & A. Chacón 2794 (holotype: INB!; isotypes: CR!, K-n.v., MO-n.v.). **Figs. 5D, 16F, 20A–G, 21E–H.**

Rhizomes erect to decumbent, scales 2.5–6.5 × ca. 0.5 mm, appressed, lanceolate to filiform, dull brown, firm, not twisted, denticulate, the teeth occasionally bifid and or black; **leaves** 0.8–1.0 m long; **petiole base scales** like those of the rhizomes but more spreading; **laminae** 0.5–0.6 m long, basally and medially 1-pinnate-pinnatifid; **lamina rachises** eglandular, pubescent or without hairs abaxially, scaly, the hairs ca. 0.5 mm long, 4- or 5-celled, the scales 2–4 × 0.3–0.4 mm, lanceolate, brown, firm, dull, spreading, denticulate to entire, not clathrate, not bullate, adaxially eglandular, pubescent, the hairs ca. 1 mm long, 6–8-celled, strongly jointed (twisted at the septae); **basal pinnae** 0.10–0.15 m long, equilateral, cut ca. half way to the pinna rachises; **pinna rachises** abaxially eglandular, pubescent to subglabrous, scaly, the hairs 0.3–0.5 mm long, 2–4-celled, ascending-appressed, the scales like those of the rachises, adaxially eglandular, without hairs or sometimes with a few hairs at the base, the hairs like those abaxially; **basal basisopic pinnules of medial pinnae** often (especially in large leaves) enlarged and overlapping the lamina rachis, entire; **costules** abaxially glabrous, scales absent; **laminar tissue between veins** on both surfaces eglandular, glabrous; **veins** abaxially obscure, sparsely pubescent, hairs 0.2–0.3 mm long, 1–3-celled, ascending, adaxially not visible, glabrous; **lamina margins** eglandular, sparsely ciliate, the hairs 0.1–0.3 mm long, 2- or 3-celled, ascending; **indusia** absent; **spores** cristate.

Distribution.—Costa Rica, western Colombia, western Ecuador; 700–2300 m.

SELECTED SPECIMENS EXAMINED.—COLOMBIA. **Antioquia:** Frontino, Corregimiento Carauta, Parque Nacional Natural Las Orquídeas, sector Tres Bocas, bosques a la orilla del Río Santiago, minas del Río Santiago, “Mina La Salada,” Finca La Pradera, 1700–1740 m, 6°37'32"N, 76°12'54"W, 8 Sep 2012, *Sundue et al.* 3265 (NY); idem, region of Murri, road between Nutibara and La Blanquita, 22.6 km from centro of Nutibara, 1340 m, 6°42'N, 76°25'W, 10 Feb 1989, *MacDougal et al.* 3886 (MO). **Boyacá:** Prov. Briceño, desvío a Vereda Manzanares, 4 km W de la Troncal del Caribe sobre la vía Ventanas-Briceño, 1800–2000 m, 7°05'N, 75°30'W, 21 Mar 1988, *Callejas et al.* 311 (MO). **Valle:** Mpio. El Cairo, Cordillera Occidental, Serranía de los Paraguas, Cerro del Inglés, vertiente sur, 2260–2300 m, [4°45'N, 76°15'W], 3 Jan 1987, *Silverstone-Sopkin et al.* 2933 (MO).

ECUADOR. **Los Ríos:** summit of Cerro Samama, Hacienda Clementina, S of road Caluma-Catarama, 700–730 m, 1°40'S, 79°19'W, 13–14 Nov 1996, *Øllgaard & Navarrete* 2046 (AAU). **Pichincha:** Km 2.2 along road to Mashpi from km 14 on road Pacto-La Delicia-La Esperanza, 1330 m, 0°8'N, 78°51'W, 1 Dec 1996, *Øllgaard et al.* 2233 (AAU); Road Pacto-La Delicia-La Esperanza, Km 19, 1350 m, 0°10'N, 78°51'W, 30 Nov 1996, *Øllgaard et al.* 2205 (AAU).

Megalastrum ctenitoides is characterized by laminae 1-pinnate-pinnatifid and all pinnae, even the basal ones, equilateral. All of the segments or lobes are adnate for their entire width to the pinna rachises, and their apices are obtuse to truncate. The segment margins are entire, never lobed or serrulate. The lamina rachises are pubescent and scaly, but the pinna rachises abaxially vary from glabrous to pubescent. Adaxially, the veins and midribs of the ultimate segments are glabrous. The lamina margins are glabrous to sparsely and remotely pubescent with minute hairs.

Megalastrum ctenitoides most resembles the less divided forms of *M. biseriale*, but that species differs by basal pinnae inequilateral and generally more divided laminae. Also similar by their laminae medially 1-pinnate-pinnatifid are *M. bolivianum* and *M. fibrillosum*. The former differs by costules and veins on both surfaces pubescent with whitish, straight hairs ca. 1 mm long (vs. glabrous). The latter differs by basal pinnae inequilateral, and pinnae with the basal basisopic segment enlarged, more lobed, and slightly overlapping the lamina rachis. Also, its scales along the pinna rachises are 3.0–4.0 mm long and fibrillose (vs 2.0–3.0 mm long). Both *M. bolivianum* and *M. fibrillosum* occur on the eastern side of the Andes, whereas *M. ctenitoides* is known only from the western side.

12. *Megalastrum decompositum* R. C. Moran, J. Prado & Sundue, *sp. nov.*
 TYPE.—ECUADOR. Bolívar: along road Chillanes–El Tambo, [2°10'S, 79°06'W], 1700–2300 m, 19 Jul 1991, H. van der Werff, B. Gray & G. Tipas 12482 (holotype, QCNE!; isotypes, MO! [barcode 04930696, 04930697], QCA-n.v., UC! [barcode 1593666]). **Figs. 7M–O, 14D, 22B.**

Rhizomes erect; **leaves** up to 2.5 m long; **petiole bases scales** 25.0–30.0 × 1.0–2.0 mm, spreading, linear to linear lanceolate, brown, flat, dull, 3-denticulate; **laminae** up to 1.5 m long, 4-pinnate-pinnatifid basally, 3-pinnate-pinnatifid medially; **lamina rachises** pubescent abaxially; **basal pinnae** ca. 75 cm long, strongly inequilateral, elongated basisopically; **pinna rachises** abaxially eglandular, densely puberulent, densely scaly, the hairs 0.1–0.3 mm long, 2–4-celled, slightly ferruginous, curved-spreading, the scales 1.5–3.0 × 0.3–0.5 mm, brown, lanceolate, spreading, denticulate, not clathrate, not bullate, adaxially densely pubescent, scaly, the hairs 0.6–1.0 mm long, 4–8-celled, spreading, the scales ca. 0.5–1.0 × 0.2–0.3 mm, lanceolate, subclathrate, brown, appressed, denticulate; **costules** abaxially sparsely glandular, pubescent, scaly, the glands ca. 0.1 mm, sessile, spherical, yellowish, the hairs 0.1–0.4 mm long, 2–4-celled, erect, scales 1.0–2.0 × 0.2–0.3 mm, linear-lanceolate to linear, subclathrate, brown, spreading, denticulate; **laminar tissue between veins abaxially** eglandular, densely puberulent, the hairs ca. 0.2 mm long, 2-celled, erect, adaxially puberulent or (1 specimen, Harling & Andersson 22459) glabrous, the hairs 0.1–0.2 mm long 2- or 3-celled, lax, tortuous, ascending; **ultimate veins** on both surfaces visible, abaxially eglandular, densely pubescent, non-scaly, the hairs ca. 0.2–0.4 mm long, 3-celled, ascending to erect, adaxially eglandular, pubescent, the hairs 0.5–0.8 mm long, 5–7-celled,

ascending; **lamina margins** eglandular, ciliate, the hairs 0.1–0.3 mm long, 2- or 3-celled, spreading; **indusia** fugacious, minute, consisting of a few hair-like scales, often covered by sporangia and apparently absent; **spores** cristate.

Distribution.—Central and southern Ecuador, on the western side of the Andes; 1700–2300 m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Bolívar**: along road Chillanes-El Tambo, 1700–2300 m, [1°55'S, 79°06'W], 19 Jul 1991, *van der Werff et al.* 12506 (MO, QCNE, UC). **Loja**: Celica-Zapotillo road, ca. Km 5, 2100–2200 m, [4°04'S, 80°03'W], 23 Feb 1985, *Harling & Andersson* 22459 (NY). **Tunguragua**: Baños, [0°23'S, 78°25'W], Jan 1892, *Sodiño s.n.* (NY).

Megalastrum decompositum has large leaves up to 2.5 m long that are 4-pinnate-pinnatifid basally. It is one of the most dissected species in the genus, thus the specific epithet *decompositum*. The scales on the axes are distinctive by being thin, subclathrate, and denticulate. Both surfaces of the laminae between the veins are pubescent, except in one specimen (*Harling & Andersson* 22459). The hairs on the adaxial surfaces between the veins are slightly tortuous and ascending, whereas those on the abaxial surfaces are straighter and mostly erect. This pubescence resembles that of *M. mollicoma*, a species differing by pinna rachis scales entire, firmer, and opaque (vs. denticulate, thin, and subclathrate) and lamina margins with longer hairs (0.3–0.8 vs. 0.1–0.3 mm long).

13. *Megalastrum falcatum* A. Rojas, *Mét. Ecol. Sist.* 3(Supl. 1):43–44, fig. 3A, B. 2008. TYPE.—ECUADOR. Zamora-Chinchipec: along road between Zumbi on Río Zamora and summit of cordillera del Condor beyond Paquisha, 10.1 km beyond Río Nangaritza bridge, 29.1 km E of Zumbi, 3°56'13"S, 78°37'27"W, 1352 m, 16 Jul 2004, *T. Croat, L. P. Hannon, G. Walhert & T. Katan* 91165 (holotype: MO! [barcode 04833356]; isotype: UC! [barcode 1793475]). **Figs. 2A, 10E, 23A–E, 24A.**

Rhizomes erect, scales 7.0–17.0 × ca. 1 mm long, appressed to ascending, linear-lanceolate, brown, lustrous, twisted, sparsely denticulate, the teeth simple or bifid; **leaves** 0.6–1.2 m long; **petiole base scales** ca. 10.0 × 1.0 mm, like those of the rhizomes but often spreading and more sparsely denticulate; **laminae** 0.5–0.9 m long, basally 2-pinnate to 2-pinnate-pinnatifid, medially 2-pinnate-pinnatifid; **lamina rachises** pubescent abaxially; **basal pinnae** 10.0–25.0 cm long, equilateral or subequilateral; **pinna rachises** abaxially eglandular, pubescent, scaly, the hairs 0.2–0.3(–0.4) mm long, 2- or 3-celled, strigose or appressed to ascending, the scales 2–5 × 0.2–0.5 mm, lanceolate, brown, appressed to widely spreading, lustrous, twisted (but not tortuous), entire to sparsely denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, scales absent, the hairs 0.4–0.6 mm long, 4- or 5-celled, acicular, ascending to strigose, light brown; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis, crenate to lobate, the proximal ones soon becoming adnate to the pinna rachis; **costules** abaxially eglandular,

sparsely pubescent, sparsely scaly, the hairs like those of the pinna rachises adaxially, the scales ca. $0.8\text{--}1.0 \times \text{ca. } 0.1$ mm, adaxially sparsely pubescent; **laminar tissue between veins** eglandular, without hairs on both surfaces; **ultimate veins** obscure or not visible, glabrous on both surfaces; **lamina margins** eglandular, very sparsely ciliate, the hairs $0.1\text{--}0.2$ mm long, 1- or 2-celled, acicular, appressed; **indusia** absent; **spores** cristate.

Distribution.—Ecuador, Peru, eastern side of the Andes; (250–)1000–2950 m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Loja**: ca. 5 km ENE of San Pedro de Vilcabamba, from “El Bosque” to Quebrada Romerillos, 2100–2200 m, $4^{\circ}14'S$, $79^{\circ}10'W$, 29 Nov 1994, Øllgaard & Navarrete 105893 (AAU, QCA). **Morona-Santiago**: along road into Cordillera del Condor departing from Chuchumbleza, then 6.8 km S of Chuchumbleza to Quime ferry on Río Zamora, then SW via Numbaime into Cordillera del Condor, 24 km SW of Río Zamora, 1562 m, $3^{\circ}38'11''S$, $78^{\circ}25'49''W$, 14 Jul 2004, Croat et al. 91009 (MO, UC). **Napo**: camino entre Baeza y Tena, 15 km al N de Tena, 1100 m, [$0^{\circ}59'S$, $77^{\circ}49'W$], 24 Jan 1984, Moran 3583 (NY, UC). **Pichincha**: one hectare plot, Lloa Valley, Hacienda Las Palmas of Lcdo, Fernando Sotomayor, Lloa-Mindo, Km 14, 2900 m, $0^{\circ}10'S$, $78^{\circ}38'W$, 8 May 1988, Jørgensen et al. 65337 (AAU, QCA, QCNE); Parroquia Calacalí, Reserva Geobotánica Palulahua, camino hacia los tanques de captación, 1800–3356 m, $0^{\circ}05'N$, $78^{\circ}30'W$, 1 Jun 1987, Cerón 1483 (MO). **Zamora-Chinchipec**: road Zamora-Romerillo, 1–1.5 km N of Romerillo, 1450–1500 m, $4^{\circ}13'S$, $78^{\circ}56'W$, 27 Nov 1994, Øllgaard & Navarrete 105854 (AAU); vic. of the mining camp at the Río Tundaime, 1000–1200 m, $3^{\circ}34'44''S$, $78^{\circ}24'11''W$, 12 Nov 2004, van der Werff et al. 19532 (MO, QCNE, UC).

PERU. **Huánuco**: La Divisoria, ca. 25 km NE of Tingo María on the road to Pucallpa, 1700 m, [$9^{\circ}17'S$, $76^{\circ}00'W$], 4 Jul 1984, Moran 3689 (MO, NY, US).

Megalastrum falcatum resembles *M. biseriale* as to hairs and scales but differs by more divided laminae that are medially 2-pinnate-pinnatisect (vs. 1-pinnate-pinnatisect). Unlike many *Megalastrum* species with laminae 2-pinnate-pinnatisect medially, *M. falcatum* has basal pinnae equilateral or nearly so, not inequilateral by being greatly prolonged basiscopically. The pinnules are sessile proximally and soon become adnate distally along the rachis. The veins are glabrous both surfaces. Similar is *M. alticola*, which differs by laminae more divided medially (3-pinnate-pinnatisect), basal pinnae inequilateral (prolonged basiscopically), wider scales on the pinna rachises abaxially ($0.5\text{--}1.0$ mm vs. $0.2\text{--}0.5$ mm wide), and veins adaxially pubescent.

14. *Megalastrum fibrillosum* (Baker) R. C. Moran, J. Prado & Sundue, *comb. nov.* *Polypodium fibrillosum* Baker, Syn. Fil. 307. 1867. *Dryopteris fibrillosa* (Baker) C. Chr., Index Fil. 264. 1905. TYPE.—PERU. San Martín: near Tarapoto, along Mayo River, [$2^{\circ}11'S$, $74^{\circ}6'W$], Jul–Aug 1856, R. Spruce 4742 (lectotype, designated by Tryon and Stolze, 1991: K [barcode 000200225]; isoelectotypes: BM! [barcode 000777148], BM! [barcode 000777147], BM!

(fragm.) [barcode 000907753], BR-n.v., P! [barcode 00630757]). **Figs. 14D, 16G, 25F-K.**

Rhizomes decumbent to erect, scales 15.0–20.0 × ca. 1 mm, appressed to ascending, linear-lanceolate, brown or golden, lustrous, flat to twisted, entire to sparsely denticulate; **leaves** up to 1.2 m long; **petiole base scales** ca. 10.0 × 0.5 mm, spreading to loosely ascending, linear-lanceolate, brown, lustrous, twisted, entire to sparsely denticulate; **laminae** to 0.8 m long, basally 1-pinnate-pinnatisect or rarely 2-pinnate, medially 1-pinnate-pinnatisect; **lamina rachises** without hairs abaxially; **basal pinnae** 10.0–20.0 cm long, equilateral, the segments adnate, often with the basal basiscopic pinnule enlarged and slightly more lobed on the basiscopic side; **pinna rachises** abaxially eglandular, sparsely pubescent (sometimes apparently without hairs), scaly, the hairs 0.1–0.2 mm long, 1- or 2-celled, spreading, the scales 3.0–5.0 × 0.2–0.3 mm, reddish-brown, linear-lanceolate, brown, lustrous, flat to twisted, spreading, entire to sparsely denticulate, not clathrate, not bullate, adaxially pubescent to glabrous, lacking scales, the hairs 0.3–1.0 mm long, 5–7-celled, antrorsely curved; **basal basiscopic pinnules of medial pinnae** often (especially in large leaves) enlarged and overlapping the lamina rachis; **costules** abaxially eglandular, without hairs, sparsely scaly, the scales 1.0–1.5 × ca. 0.1 mm, otherwise like those of the pinna rachises, adaxially glabrous or sparsely pubescent, the hairs similar to those of the pinna rachises; **laminar tissue between veins** abaxially eglandular, glabrous, often with numerous appressed proscas, adaxially eglandular, glabrous; **ultimate veins** abaxially glabrous, usually obscure, adaxially obscure or glabrous partially visible; **lamina margins** eglandular, sparsely ciliate, the hairs ca. 0.2 mm long, 1- or 2-celled, acicular, ascending or sometimes appressed; **indusia** absent; **spores** cristate.

Distribution and ecology.—Ecuador, Peru, Bolivia, eastern side of Andes; 260–1700 m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Morona-Santiago:** Morona Cantón, near the city of Macas, 1000 m, 2°20'S, 78°08'W, 7 Aug 1993, *Fay & Fay 4014* (AAU, F, MO). **Napo:** Añangu, Río Napo, 260–350 m, 0°31'S, 76°23'W, 8 Mar 1983, *Holm-Nielsen et al. 26896* (AAU). **Zamora-Chinchipec:** Nangaritza Cantón, Shaimi, SE de Campamento Militar, margen derecha de Río Nangaritza, 930 m, 4°18'S, 78°43'W, 27 Oct 1991, *Palacios et al. 8764* (COL, MO, NY, QCNE).

PERU. **Huánuco:** La Divisoria, ca. 25 km NE of Tingo María on the road to Pucallpa, 1700 m, [9°17'S, 76°00'W], 4 Jul 1984, *Moran 3707* (BM, NY). **Junín:** Schunke Hacienda, above San Ramón, 1400–1700 m, 11°07'S, 75°19'W, 8–12 Jun 1929, *Killip & Smith 24659* (NY, US). **Loreto:** Fundo chela, Sinchono, 3 Aug 1948, *Aguilar s.n.* (GH). **Madre de Dios:** Prov. Manu, Parque Nacional Manu, Río Manu, Río Sotileja, 400–450 m, 11°40'S, 71°55'W, 2 Oct 1986, *Foster et al. 11598* (F, MO, US). **Pasco:** Oxapampa, along road Chatarra-Cacazu, forest on steep, rocky slopes, 890 m, 10°32'S, 075°04'W, 1 Jul 2003, *van der Werff et al. 18275* (MO, NY).

BOLIVIA. **Beni**: Prov. Ballivian, 138 km N of Caranavi, 700 m, 15°20'S, 67°12'W, 20 Jun 1989, *Fay & Fay 2051* (MO). **Cochabamba**: Chapare, El Palmar, 700 m, 17°05'S, 65°32'W, 4 Sep 1996, *Kessler et al. 8126* (GOET, NY). **La Paz**: Prov. Abel Iturralde, Parque Nacional Madidi, campamento de guardaparques Sadiri, camino Sadiri-Tumupasa, 900 m, 14°10'S, 67°55'W, 3 Jul 2004, *Jiménez & Huaylla 2547* (NY). **Santa Cruz**: Prov. Ichilo, 4 km SW del Campamento Macuñucu, 17°44'S, 63°35'W, 27 Sep 1996, *Kessler et al. 8680* (GOET).

Megalastrum fibrillosum is characterized by laminae medially 1-pinnate-pinnatisect or 2-pinnate, pinnae equilateral, and (at least in large laminae) the basal basiscopic segments often slightly enlarged and overlapping the lamina rachis. The overlapping segments are somewhat wider and more lobed on the basiscopic side. The species is further distinct by pinnae rachises abaxially with conspicuous dark spreading scales. The indument on the pinna rachises adaxially varies from glabrous to pubescent. Many specimens of *M. fibrillosum* were identified previously as *M. honestum* (Baker) A. R. Sm. & R. C. Moran (e.g., by Tryon and Stolze 1991), a name here considered of uncertain application.

Several species resemble *Megalastrum fibrillosum* in lamina dissection. One is *M. platylobum*, which differs by pinna rachis hairs longer (up to 0.5 mm) and the scales sparse, inconspicuous, and appressed. *Megalastrum bolivianum* differs by costules and veins adaxially with long (ca. 1 mm) straightish hairs (vs. glabrous), and by the lamina and pinna rachises abaxially scaly by wider lanceolate (not fibrillose) scales. *Megalastrum ctenitoides* differs by rhizome scales smaller, 2.5–4.5 mm long (vs. 15–20 mm), lamina and pinnae rachises with lanceolate scales (vs. fibrillose), and lamina margins glabrous or nearly so (vs. ciliate). See *M. molle* for comparison with that species.

15. *Megalastrum fimbriatum* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.— PERU. San Martín: Prov. Mariscal Cáceres, trail between La Playa camp and Papayas camp, Río Abiseo National Park, 7°45'S, 77°15'W, 25 Jul 1987, K. Young & B. León 4958 (holotype, F! [barcode 1999770]; isotypes, AAU!, GH-n.v., USM-n.v.). **Figs. 10F, 14B, 15A–E.**

Rhizomes erect, scales 1.5–1.8 × ca. 0.3–0.8 mm, appressed to ascending, linear-lanceolate, light brown, lustrous, flat to twisted, sparsely denticulate; **leaves** up to 0.5 m long; **petiole base scales** up to ca. 1.5 × 2 mm, spreading to ascending, lanceolate to linear-lanceolate, brown, lustrous, flat, denticulate; **laminae** 20–30 cm long, basally 2-pinnate-pinnatifid or 3-pinnate, medially 2-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** up to 15 cm long, equilateral to subequilateral; **pinna rachises** abaxially eglandular, densely pubescent, scaly, the hairs 0.5–0.8 mm long, 4–6-celled, spreading, scales up to 3 × 0.5 mm long, lanceolate, brown, lustrous, flat, spreading, entire to subentire, not clathrate, not bullate, adaxially eglandular, moderately to sparsely pubescent, very sparsely scaly, hairs up to 2.5 mm long, 5–8-celled, spreading, the scales like those abaxially; **costules** abaxially eglandular, sparsely pubescent, sparsely scaly, the hairs like those abaxially, the scales like

those of pinna rachises but shorter up to 2 mm long, adaxially sparsely pubescent, the hairs like those of the pinna rachises abaxially, scales absent; **laminar tissue between veins** abaxially glabrous, adaxially with scattered hairs toward the margins, the hairs 0.5–1.0 mm long, 6–8-celled, appressed; **ultimate veins** on both surfaces visible, abaxially very sparsely glandular (often apparently eglandular), sparsely pubescent, the glands ca. 0.1 mm long, sessile, reddish, the hairs 0.2–0.5 mm long, 2–4-celled, adaxially sparsely glandular, pubescent, scales absent, the glands ca. 0.1 mm long, sessile, reddish, the hairs ca. 1.0–1.5 mm long, 5–8-celled, whitish, lax, slightly tortuous; **laminar margins** ciliate, eglandular, the hairs 0.5–1.2 mm long, 5–9-celled, lax, spreading to ascending; **indusia** absent; **spores** cristate.

Distribution.—Peru; 2280–2750 m.

SPECIMENS EXAMINED.—PERU. **Bagua**: Amazonas, Third camp, Cordillera Colan SE of La Peca, 2280–2400 m, [5°38'S, 78°31'W], 30 Sep 1978, *Barbour 3682* (MO).

Megalastrum fimbriatum is distinctive by small laminae (20–30 cm long), pinnules mostly adnate for their entire width to the pinna rachises, pinna rachises abaxially densely pubescent and scaly, lamina margins fimbriate with long (0.8–1.2 mm), lax cilia (thus the specific epithet *fimbriata*). It resembles *M. peruvianum* but differs by longer (0.5–1.5 vs. 0.2–0.5 mm) hairs on the veins adaxially and the tissue between the veins glabrous on both surfaces (vs. pubescent). Tryon and Stolze (1991) thought that the holotype represented a “depauperate specimen of high elevation variant” of *M. pulverulentum*; however, this species does not have cristate spores and does not belong to the *M. pulverulentum* clade. It is amply distinct from *M. pulverulentum* by its small leaves (up to 0.5 m vs. up to 4 m long), less divided laminae (medially 2-pinnate-pinnatisect vs. medially 3-pinnate-pinnatisect), and pinna rachis scales not darkened distally.

16. *Megalastrum fugaceum* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.—BOLIVIA. Santa Cruz: Prov. Florida, Cantón Mairna, Parque Nacional Amboró, 7 km NNE by air from Mairana, 18°03'S, 65°55'W, 1900–2200 m, 23 Jul 1994, *R. C. Moran 5911* (holotype: LPB!; isotypes: AAU!, NY! [barcode 00870951], UC! [barcode 1604363, 1604364]). **Figs. 2D,F, 3G, 24B, 26A–D, E–G.**

Rhizomes erect, scales 20.0–35.0 × 0.5–1.5 mm, linear, ascending, castaneous, slightly lustrous, flat or twisted, not tortuous, sparsely to retrorsely denticulate, apically with spreading or retrorse teeth; **leaves** up to 4 m long; **petiole base scales** like those of the rhizomes, sometimes forming a wool-like tuft; **laminae** 1–3 m long, basally 3-pinnate-pinnatisect to 4-pinnate, medially 3-pinnate-pinnatisect; **lamina rachises** glabrous to sparsely pubescent abaxially; **basal pinnae** ca. 1.4 m long, strongly inequilateral; **pinna rachises** abaxially eglandular, glabrous or pubescent, sparsely scaly, the hairs (when present) 0.4–0.8 mm, 3–5-celled, spreading, the scales 0.1–1.8 × 0.1–0.5 mm,

ovate to lanceolate, appressed or spreading, light to dark brown, often darker distally, strongly denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.3–0.5 mm long, 3–6-celled, spreading, scales $0.5\text{--}3.0 \times 0.1\text{--}0.4$ mm, linear-lanceolate, darkened toward the apex, strongly denticulate; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially with indument like that of the pinna rachises but scales larger, to $0.5\text{--}2.5 \times 0.2\text{--}0.3$ mm, ovate (smaller scales) to linear (longer scales), strongly darkened toward the tip denticulate, adaxially like the pinna rachises but hairs 0.3–2.0 mm long, 3–5-celled, spreading; **laminar tissue between ultimate veins** on both surfaces eglandular, glabrous or pubescent, the hairs (when present) 0.2–0.4 mm long, 3- or 4-celled, erect; **ultimate veins** visible on both lamina surfaces, eglandular, abaxially subglabrous to moderately pubescent, the hairs (when present) 0.2–0.4 mm long, ca. 3-celled, spreading, adaxially similar but when pubescent the hairs 0.5–0.7 mm long, 3–6-celled, strigose to laxly spreading; **lamina margins** eglandular, ciliate, the hairs 0.1–1.2 mm long, 2–4-celled, spreading to ascending; **indusia** minute, fugacious, apparently consisting of a cluster of reddish proscapes, ca. 0.1 mm long, protruding from the center of the sorus, not easily observed in mature sori; **spores** echinulate.

Distribution.—Ecuador, Peru, Bolivia, Argentina; 1060–2300(–3500) m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Carchi:** Espejo, El Gualtal, faldas de Cerro Golondrina Hembra, 2450 m, $0^{\circ}51'N$, $78^{\circ}07'W$, 21 Aug 1994, *Palacios* 12645 (MO, QCNE). **Chimborazo:** in valle Pallatango, [$1^{\circ}59'S$, $78^{\circ}57'W$], s.d., *Sodi* 113 (P). **Loja:** trails ca. 5 km ENE San Pedro de Vilcabamba, from “El Bosque” to Quebrada Romerillos and Banderilla, open trail banks in pastures and deep wet stream ravines, 2000–2200 m, $4^{\circ}14'S$, $79^{\circ}10'W$, 30 Nov 1994, *Ollgaard & Navarrete* 105941 (AAU). **Napo:** Quijos Cantón, swampy forest on NE side of Quijos, go N on the road E of the Colegio, toward the river, 1850 m, $0^{\circ}27'30"S$, $77^{\circ}53'W$, 6–8 Aug 1992, *Fay & Fay* 3870 (MO, NY); road Baeza-Tena, 2 km N of Consaga, 2000–1900 m, $0^{\circ}34'S$, $77^{\circ}53'W$, 19 Jan 1992, *Ollgaard et al.* 99556 (AAU). **Pichincha:** camino Calacalí-Nanegalito, 18 km from Mitad del Mundo, inclination steep, orientation 280, few disturbances, 2040–2090 m, $0^{\circ}01'N$, $78^{\circ}37'W$, 20–25 Apr 1995, *Ankersen & Kragelund* 140 (AAU, QCA). **Zamora-Chinchipec:** New road Loja to Zamora, 13 km E of the Pass, Wet forest along creek that crosses the road, 2000 m, $4^{\circ}00'S$, $79^{\circ}02'W$, 14 Feb 1991, *Moran & Rohrbach* 5380 p.p. (MO, QCNE, UC).

PERU. **Cusco:** Distr. Huayopata, Huyro, Calquiña, 1600 m, $12^{\circ}52'01"S$, $72^{\circ}32'46"W$, 26 Jun 2003, *Bonino et al.* 734 (MO, NY). **Urubamba:** Machu Picchu, on a slope, 5 km N of the union of the Sayacmarca and Aobamba Rivers, 2160 m, [$13^{\circ}09'S$, $72^{\circ}32'W$], 14 Oct 1982, *Peyton* 1497 (MO).

BOLIVIA. **Chuquisaca:** Sud Cinti, cercanías de una quebrada con aguas que desembocan al Río Alborniyoj, 2300 m, $20^{\circ}45'23"S$, $64^{\circ}31'46"W$, 11 Oct 2000, *Llully et al.* 101 (MO). **Cochabamba:** 130 km antigua carretera Cochabamba-Villa Tunari, 2000 m, $17^{\circ}08'S$, $65^{\circ}38'W$, 11 Jul 1996, *Kessler et al.* 7189 (GOET, UC). **La Paz:** Prov. Franz Tamayo, Area Natural de Manejo Integrado

Apolobamba, 2372 m, [14°39'S, 69°14'W], 10 Jun 2008, *Huaylla et al.* 2655 (MO). **Santa Cruz:** Manuel M. Caballero, bosque hiperhumedo de Ceja de Monte, Colecta en la comunidad El Locotal sobre el camino a San Mateo a 10 km del cruce El Empalme, 2364 m, 17°47'43"S, 64°43'15"W, 17 Jun 2003, *Núñez & Huaylla* 178 (NY, UC). **Tarija:** Arce, Mpio. Padyaca, Reserva Nacional de Flora y Fauna Tariquia, 1660 m, 22°00'S, 64°29'W, 14 Nov 2004, *Serrano et al.* 5225 (GOET, MO); idem, bajando de La Cumbre hacia Potreros, una sola planta, ladera con Río permanente, 1706 m, 22°00'20.5"S, 64°31'59"W, 13 Dec 2004, *Huaylla et al.* 1554 (MO, NY).

ARGENTINA. **Jujuy:** Depto. Ledesma, Parque Nacional Calilegua, RP 83, Aguada del Tigre, 1600 m, 23°41'S, 64°53'W, 7 Apr 2010, *Martínez & Prado* 1894 (MCSN, NY, SP). **Tucumán:** Monteros, Quebrada Pueblo Viejo, [27°10'S, 65°30'W], Jan 1965, *de la Sota* 4069 (US).

Megalastrum fugaceum resembles *M. pulverulentum* by its large leaves (up to 4 m long) and scales of the pinna rachises and costules usually darkened apically and strongly denticulate. *Megalastrum pulverulentum* differs by laminae with longer (1.0–2.0 mm) and denser hairs; its lamina and pinna rachises are conspicuously pubescent to naked eye. In contrast, *M. fugaceum* is a less pubescent version. Its hairs are only 0.4–0.8 mm long and relatively sparse, not conspicuously pubescent to the naked eye. Whereas *M. pulverulentum* is pubescent between the veins abaxially, *M. fugaceum* is glabrous except in a few instances. In those instances, the hairs are much shorter (0.2–0.4 mm long) than those in *M. pulverulentum*. There is considerable variation in the occurrence of hairs in *M. fugaceum*. The type has sparse whitish hairs on both surfaces of the veins, whereas other plants are glabrous.

17. *Megalastrum galapagense* R. C. Moran, J. Prado & Sundue, *sp. nov.*
 TYPE.—ECUADOR. Galapagos Islands: Isla Isabela, SW slope of Volcano Cerro Azul, [0°38'S, 90°22'W], 800 m, Aug 1975, *H. H. van der Werff* 2244 (holotype: NY! [barcode 01093322]; isotypes: MO-n.v., U! [barcode 0249530]). **Figs. 14C, 200–P, 27C.**

Rhizomes erect, the scales 20.0–30.0 × 0.6–1.1 mm, appressed to ascending, linear-lanceolate, golden brown, lustrous or dull, flat to tortuous, the surfaces smooth (not setulose), denticulate, the teeth simple or bifid; **leaves** up to 2.5 m long; **petiole base scales** like those of the rhizomes but to 15.0 × 0.7 mm, spreading to loosely ascending; **laminae** up to 1.5 m long, basally and medially 2-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** 0.35 m long, equilateral; **pinna rachises** abaxially eglandular, sparsely pubescent, sparsely scaly, the hairs 0.4–0.5 mm long, 3–4-celled, spreading, acicular, the scales 1.5–3.5 × 0.1–0.3 mm, filiform to linear-lanceolate, brown, lustrous, conspicuously denticulate, not clathrate, not bullate, adaxially eglandular, pubescent, scales absent, the hairs 0.7–1.0 mm long, 4–6-celled, acicular, tortuous, catenate; **basal basisopic pinnules of medial pinnae** not

enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, sparsely pubescent, sparsely scaly, the hairs 0.3–0.5 mm long, 3- or 4-celled, erect, acicular, hyaline, the scales ca. 0.5–1.0 × 0.1 mm, otherwise like those of the pinna rachis, adaxially eglandular, glabrous to sparsely pubescent, scales absent, the hairs 0.3–0.5 mm long, 3- or 4-celled, acicular, hyaline, catenate, ascending, tortuous; **laminar tissue between veins** abaxially eglandular, sparsely pubescent, the hairs 0.2–0.3 mm long, 2- or 3-celled, acicular, erect, hyaline, adaxially eglandular, glabrous; **ultimate veins** visible on both surfaces, abaxially eglandular, sparsely pubescent, the hairs similar to those of the abaxial pinna costae; adaxially eglandular, glabrous; **lamina margins** eglandular, ciliate, the hairs 0.3 mm long, 2- or 3-celled, erect, acicular, ascending; **indusia** absent; **spores** cristate.

Distribution and ecology.—Isabella Island in the Galapagos Archipelago; *Miconia* belt vegetation; 800 m.

SPECIMENS EXAMINED.—ECUADOR. **Galápagos:** Isabella Island, SW slope of Volcano Cerro Azul, 800 m, [0°01'S, 91°12'W], Aug 1975, *van der Werff* 2256, 2257 (U).

Megalastrum galapagense and *M. pleiosoros* are the only *Megalastrum* in the Galapagos Islands. They are similar in lamina shape, but *M. galapagense* differs by longer leaves, up to 2.5 m long (vs. 1.0 m), laminae more divided (2-pinnate-pinnatisect medially vs. 1-pinnate-pinnatisect to (one specimen) 2-pinnate-pinnatifid medially), and pinna rachises and costules abaxially sparsely pubescent (vs. densely pubescent). In *M. galapagense* the hairs on the abaxial surfaces of the laminae are shorter than in *M. pleiosoros* (0.4–0.5 mm long, 3–4-celled, vs. 0.6–1.0 mm long, 6–8-celled).

The specific epithet *galapagense* refers to the Galapagos Islands. *Megalastrum galapagense* occurs only on Isabella Island, whereas *M. pleiosoros* occurs on Isabella and others.

- 18. *Megalastrum hirsutosetosum*** (Hieron.) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:128. 1987 [published 3 May 1988]. *Dryopteris hirsutosetosa* Hieron., Hedwigia 46:343, tab. 6, 16. 1907. *Ctenitis hirsutosetosa* (Hieron.) Lellinger, Proc. Biol. Soc. Wash. 89:709. 1977. **TYPE.**—ECUADOR. Tungurahua?: plateau above Allpayacu between Baños and Jivaría de Píntuc, s.d., *M. A. Stübel* 903 (lectotype, designated by Christensen, 1920: B! [barcode 200057934], photo BM; isolectotype: BM! (fragm.) [barcode 000907751]). **Figs. 24C, 28K–P, 29A.**

Rhizomes erect, scales ca. 10.0 × ca. 1.5 mm, lanceolate, golden brown, lustrous, tortuous, denticulate; **leaves** up to 1 m long; **petiole base scales** ca. 10.0 × ca. 1 mm, lanceolate, spreading, brown, lustrous, flat to twisted, denticulate; **laminae** 0.5–0.8 m long, basally 2-pinnate to 2-pinnate-pinnatisect, medially 1-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** 8.0–15.0 cm long, usually slightly inequilateral, sometimes equilateral; **pinna rachises** abaxially eglandular, pubescent, sparsely scaly, the

hairs ca. 1.5 mm long, 6–8-celled, acicular, spreading to erect, whitish, the scales ca. 1×0.1 mm, appressed to spreading, filiform, brown, tortuous, denticulate, not clathrate, not bullate, adaxially eglandular, densely pilose, without scales, the hairs similar to those of the pinna rachises abaxially; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, pubescent, without scales, the hairs ca. 1.5 mm long, 7–10-celled, appressed to spreading, acicular, hyaline, adaxially eglandular, sparsely pilose, scales absent, the hairs like those of the adaxial pinna rachises; **laminar tissue between veins** both surfaces eglandular, pubescent, the hairs similar to those of the abaxial pinna rachises and costules; **ultimate veins** obscure and pilose on both surfaces, the hairs similar to those of the laminar tissue; **lamina margins** eglandular, ciliate, the hairs ca. 1.0 mm long, 5–7-celled, acicular, spreading; **indusia** absent; **spores** cristate.

Distribution and ecology.—Colombia, Ecuador, and Peru, eastern slopes of the Andes; 450–1200(–2250) m.

SELECTED SPECIMENS EXAMINED.—COLOMBIA. **Chocó-El Valle:** at and on both sides of the principal ridge of the Serranía de Los Paraguas, along the trail from El Cairo to Río Blanco, ca. 8 km SW of El Cairo, 2200–2250 m, $4^{\circ}12'S$, $75^{\circ}48'W$, 20 March 1971, *Lellinger & de la Sota* 840 (US).

ECUADOR. **Carchi:** Border area between Prov. Carchi and Esmeraldas, about 7 km past Lita on road Lita-Alto Tambo, 550 m, [$0^{\circ}50'N$, $78^{\circ}28'W$], 27 Jun 1991, *van der Werff et al.* 12094 (MO, QCA, QCNE). **Esmeraldas:** Pachicutza, at “Escuela Fiscomisional Cardinal Döpfner”, Km 140 on road Loja-Gualaquiza, Tropical rain forest with cleared areas Río Zamora and along the road, 900–1000 m, $3^{\circ}37'S$, $78^{\circ}34'W$, 26–27 Apr 1973, *Holm-Nielsen et al.* 4502 (AAU, MO, NY). **Napo:** Hollin-Loreto road, 32 Km mark, 3–4 km S of road, path to permanent sampling plot, 1200 m, $0^{\circ}35'S$, $77^{\circ}25'W$, 25 Jan 1991, *Moran & Rohrbach* 5160 (AAU, MO, NY). **Pastaza:** Río Pastaza, between Baños and Mera, 1219 m, [$1^{\circ}23'S$, $78^{\circ}03'W$], 4 Jul 1905, *Tate* 650 (US). **Zamora-Chinchipec:** Cordillera del Condor, Río Wawaime watershed, tributary of Río Quimi, along road above Ecuacorriente mine camp, 1300 m, $3^{\circ}34'43''S$, $78^{\circ}26'07''W$, 26 Oct 2006, *van der Werff et al.* 21715 (MO, NY); Miazzi, at junction of Río Chumbiriatza with Río Nangaritzza, 1200–950 m, $4^{\circ}19'S$, $78^{\circ}40'W$, 21–23 Oct 1991, *Øllgaard et al.* 99268 (AAU, QCA).

PERU. **Cajamarca:** Prov. San Ignacio, Distr. San José de Lourdes, localidad de Buenos Aires, Cerro El Parco, 1900 m, $5^{\circ}42'04''S$, $77^{\circ}53'06''W$, Feb 2002, *Bonino* 178 (MO). **Junín:** Pichis trail, San Nicolas, 1100 m, 4–5 Jul 1929, *Killip & Smith* 26037 (NY, US). **Pampayacu:** Pampayacu, [$11^{\circ}09'S$, $76^{\circ}36'W$], 28 Jan 1927, *Kanehira* 184 (GH).

Megalastrum hirsutosetosum has laminae with both surfaces densely and conspicuously pubescent to the naked eye. The hairs are 1.0–1.5 mm long, 5–7-celled, and present on and between the veins of both surfaces. It is further distinguished by laminae medially 2-pinnate to 2-pinate-pinnatisect and by rachis scales filiform, ca. 1×0.1 mm. *Megalastrum platylobum* is similar in

lamina dissection and size but differs by pinna rachises abaxially densely pubescent by hairs of mixed lengths, all of which are shorter than those found in *M. hirsutosetosum*.

19. *Megalastrum insigne* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.—ECUADOR. Napo: Cantón Quijos, south of Quijos, just east of Baeza, trail through pastures and up into the jungle, now being logged, terrestrial, 0°28.5'S, 77°53.5'W, 2100 m, 4 Aug 1992, A. Fay & L. Fay 3827 (holotype: NY! [barcode 01053865]; isotypes: AAU! 3-sheets; MO [barcode 05083493, 05083493], QCA-n.v., QCNE-n.v.). **Figs. 2B, 4M–X, 6E, 24D.**

Rhizomes erect, the scales 10.0–20.0 × 1.0–2.0 mm, appressed to ascending, lanceolate, brown to dark brown, lustrous, flat, densely denticulate; **leaves** up to 1.5 m long; **petiole base scales** like those of the rhizomes but spreading to loosely ascending; **laminae** 0.5–0.7 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** 15.0–25.0 cm long, strongly inequilateral; **pinna rachises** abaxially glandular, densely pilose, sparsely scaly, with 0.1 mm long, short-stipitate and sessile glands, the hairs 1.0–1.5 mm long, 5–8-celled, acicular, spreading, hyaline, whitish to ferruginous or tan, the scales 1–3 × 0.4–0.8 mm, lanceolate, spreading, brown, not flaccid, shiny, entire to sparsely denticulate, not clathrate, not bullate, adaxially eglandular, without scales, densely pilose, the hairs 0.7–1.5 mm long, 5–12-celled, spreading to ascending, acicular; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially sparsely glandular, pilose, sparsely scaly, the glands and hairs like those of the pinna rachises, the scales ca. 2.0 × 0.3 mm, like those of the pinna rachises, adaxially sparsely glandular, densely pilose, the glands and hairs like those of the pinna rachises abaxially; **laminar tissue between veins** on both surfaces glandular, moderately to densely pubescent, the hairs 0.8–1.2 mm long, 5–8-celled, acicular, erect to appressed, some of the hairs gland-tipped, 0.2–0.4 mm long, 3- or 4-celled, the sessile glands ca. 0.1 mm long, spherical, yellowish; **ultimate veins** with hairs and glands the same as those on the laminar tissue between the veins, abaxially the veins partially visible, adaxially obscure; **lamina margins** eglandular, ciliate, the hairs 0.4–0.8 mm long, 3–7-celled, acicular, spreading to ascending; **indusia** present, ca. 1 mm wide, conspicuous, circular, concolorous, brown, glandular, pubescent, the glands sessile or short-stalked, the sessile glands 0.1 mm long, the stalked glands 0.2 mm long, the hairs 0.3–1.0 mm long, 3–7-celled, acicular, erect, hyaline; **spores** cristate.

Distribution and ecology.—Colombia, Ecuador, Peru, both sides of the Andes; 1300–2400 m.

SELECTED SPECIMENS EXAMINED.—COLOMBIA. **Antioquia:** Río Calderas, cerca de Cocorná, [5°58'N, 75°06'W], Jan 1953, *Daniel Bro.* 4473 (US). **Caldas:** Pueblo Rico [Neira], Cordillera Occidental, vertiente Occidental, 1700–1900 m, [5°08'S, 75°31'W], 17 Feb 1946, *von Sneidern* 5236 p.p. (US). **Cauca:** Montaña

del Oro, [5°08'N, 75°31'W], s.d., *Lehmann 7416* (K). **Valle:** Finca la Pradera, 6 km SW of El Cairo on the trail to Río Blanco, between El Brillante and Boquerón, 2150–2200 m, [4°12'N, 75°48'W], 27 Mar 1971, *Lellinger & de la Sota 815* (US).

ECUADOR. **Loja:** trails ca 5 km ENE of San Pedro de Vilcabamba, from “El Bosque” to Quebrada Romerillos and Banderilla, 2000–2200 m, 4°14'S, 79°10'W, 30 Nov 1994, *Ollgaard & Navarrete 105938* (AAU). **Napo:** forest ridge just S of Baeza, 1950–2100 m, 0°28'S, 77°53'W, 31 Mar 1992, *Ollgaard 99904* (AAU, QCA, QCNE); road Baeza-Tena, 2 km of Cosaga, 1900–2000 m, 0°34'S, 77°53'W, 17 Jan 1992, *Ollgaard et al. 99554* (AAU); Valley of Río Oyacachi, ca 10 km along road W of El Chaco, trail along river to Río San Juan Grande, 1760–1800 m, 0°17'S, 77°51'W, 12 Mar 1996, *Ollgaard & Navarrete 1630* (AAU). **Pastaza:** Montaña de Canelos, 1600 m, [1°30'S, 78°03'W], Aug 1860, *Spruce 5295 p.p.* (BM, K, NY, P). **Pichincha:** Cantón Quito, Río Guajalito Reserve, 10 km W of Chiriboga, Km 59 of old road Quito-Santo Domingo, 1900 m, 0°14'S, 78°48'W, 10 Jul 1991, *Fay & Fay 3370* (AAU, MO, NY, QCA, QCNE); Cerro Antisana, primary montane forest 2 mi. SE of Borja, 1737 m, 0°30'S, 78°W, 3 Aug 1960, *Grubb et al. 1195* (BM, NY, US). **Santiago-Zamora:** high wooded slopes, on W side of Río Valladolid, above Valladolid, 2100–2400 m, [4°33'S, 79°03'W], 15 Oct 1943, *Steyermark 54713* (F, US). **Tungurahua:** San Antonio, eastern slope of Tungurahua Volcano, 1737 m, [1°28'1"S, 78°26'30"W], 1924, *Tate 573* (US). **Zamora-Chinchipec:** Parque Nacional Podocarpus, Quebrada Río San Francisco, at new road Loja-Zamora, 2040–2250 m, 3°58'S, 79°05'W, 23 Jun 1988, *Ollgaard 74966* (AAU, QCA).

PERU. **Amazonas:** Bongara, Hills 1–5 km. S-SE (150°) of Yambrasbamba, 2100–2400 m, [5°45'S, 77°54'W], 25 Jun 1962, *Wurdack 1030* (GH, NY, US). **Cajamarca:** San Ignacio, San José de Lourdes, Camaná, 2000–2200 m, 5°00'00"S, 78°55'00"W, 20 Mar 1997, *Campos & Corrales 3593* (GH, MO, NY). **Cusco:** La Convención, Dist. Huayopata, Amaybamba, Quinsapunkuyoq, 2050 m, 12°59'18"S, 72°30'06"W, 22 Nov 2003, *Bonino et al. 1104 p.p.* (MO). **Pasco:** Oxapampa, 1768 m, [10°06'S, 75°09'W], Aug 1947, *Soukup 3354* (GH, US). **San Martín:** Prov. Mariscal Caceres, alrededores de la Morada, 2200–2300 m, [7°33'S, 76°47'W], 25 Jun 1995, *Quipuscoa et al. 11* (AAU, F). **San Martín-Huallaga:** Abajo de La Morada, cerca del Río Guabayacu, 1900–2200 m, 6°57'S, 77°32'W, 10 Aug 1997, *Quipuscoa & Bardales 958* (AAU, F).

Megalastrum insigne is characterized by the presence of conspicuous circular indusia pubescent by hairs 0.3–1.0 mm long, and laminae with both surfaces densely and conspicuously pubescent. The specific epithet *insigne* (remarkable, outstanding) refers to the dense, conspicuous indument of the leaves. *Megalastrum insigne* has been confused with *M. andicola* but differs by laminae and indusia with longer hairs (for laminae, 0.8–1.2 mm long, 5–7-celled; for indusia, 0.3–1.0 mm long, 3–7-celled). To the naked eye, the denser, more conspicuous pubescence distinguishes *M. insigne* from the similar *M. acrosorum* and *M. andicola*.

20. **Megalastrum marginatum** M. Kessler & A. R. Sm., Amer. Fern J. 96:40, fig. 2G–J. 2006. TYPE.—BOLIVIA. La Paz: Prov. Nor Yungas, Cerro Hornuni, 16°01'S, 67°52'W, 27 Nov 1998, *A. Portugal 538* (holotype: UC! [barcode 1736806]; isotype: LPB-n.v.). **Figs. 9A–E, 10A, 24A.**

Rhizomes erect, scales 5.0–12.0 × 0.2–0.6 mm, linear-lanceolate, spreading to ascending, brown to golden brown, lustrous, twisted, denticulate, the teeth simple or sometimes bifid, sometimes retrorse; **leaves** 0.6–0.7 m long; **petiole** simple or sometimes bifid, sometimes retrorse; **base scales** like those of the rhizomes but spreading to loosely ascending; **laminae** 0.4–0.5 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatifid; **lamina rachises** pubescent abaxially; **basal pinnae** 15.0–18.0 cm long, strongly inequilateral; **pinna rachises** abaxially eglandular, pubescent, scaly, the hairs (0.5–)1.0–1.7 mm long, 4–7-celled, straightish, spreading, white, the scales 1.5–3.0 × 0.2–0.8 mm, lanceolate, brown, lustrous, denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.5–1.8 mm long, 4–7-celled, spreading, straightish, white, the scales like those abaxially; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, sparsely pubescent, sparsely scaly, the hairs like those of the pinna rachises, the scales like those of the pinna rachises but smaller 0.5–0.8 × 0.2–0.3 mm, adaxially eglandular, sparsely pubescent, without scales, the hairs 0.5–1.0 mm long, 4–6-celled; **laminar tissue between veins** on both surfaces eglandular, glabrous; **ultimate veins** visible on both surfaces, abaxially eglandular, glabrous to sparsely pubescent, the hairs 0.2–0.4 mm long, 2- or 3-celled, spreading, straightish, white, adaxially pubescent, the hairs 0.7–1.0 mm long, 3- or 4-celled, appressed, ascending, straightish, whitish; **lamina margins** eglandular, ciliate, the hairs 0.3–0.5 mm long, 2- or 3-celled, straightish, whitish, ascending; **indusia** absent; **spores** cristate.

Distribution.—Bolivia; 400–1900 m.

SELECTED SPECIMENS EXAMINED.—BOLIVIA. **Carrasco:** Cochabamba, 400 m, 17°17'35"S, 64°52'87"W, 19 Jan 2000, *Jiménez 226* (UC). **Cochabamba:** Prov. Tiraque, Km 18 al Palmar, 900 m, 17°05'35"S, 65°29'35"W, 2 Sep 2003, *Zabalaga 16* (NY). **La Paz:** Abel Iturralde, Parque Nacional Madidi, campamento de guardaparques Sadiri (entre Tumupasa y San Juan de Uchupiamonas), 950 m, 16°10'S, 67°54'W, 2 Jul 2004, *Jiménez & Huaylla 2518* (NY, UC); Prov. Nor Yungas, Cantón Pacollo, Estación Biológica Tunquiri, Hornuni Bajo, 1900 m, 16°42'S, 67°52'W, 24 Jul 2001, *Bach 1234* (UC); Prov. Sud Yungas, Sapecho, Colonia Tupiza, 735 m, 15°32'S, 67°18'W, 29 Oct 1997, *Krömer et al. 100* (GOET, UC).

Megalastrum marginatum is characterized by 0.5–1.7 mm long, straight, whitish hairs on both surfaces of the pinna rachises, costules, and veins. The density of the hairs varies, but at least a few long straight hairs are always present. The species most resembles *M. rupicola*, which differs by the lack of hairs. In both species the lamina cutting is similar, and the pinna rachis scales are similar by being lanceolate and shiny brown.

Moran and Prado (2010) cited *Megalastrum longipilosum* A. Rojas from Ecuador and Bolivia. The Bolivian report was based on a misidentified specimen of *M. marginatum*. The Ecuadorian report was based on two specimens (*Ollgaard et al.* 2247, *Ankersen & Kragelund* 211, both AAU, QCA) that represent a new species, *M. obtusum*, described below. *Megalastrum longipilosum* is endemic to Costa Rica and Panama.

21. *Megalastrum martinicense* (Spreng.) R. C. Moran, J. Prado & Labiak, *Brittonia* 61:284. 2009. *Alsophila martinicensis* Spreng., *Neue Entdeck. Pflanzenk.* 3:7. 1822. *Phegopteris martinicensis* (Spreng.) Fourn., *Mex. Pl.* 1:90. 1872. TYPE.—MARTINIQUE. s.d., *F. Kohaut s.n.* (Sieber Syn. Fil. no. 162) (lectotype, designated by Proctor, 1989: L-n.v., photos MICH!, NY!, US!; isolectotypes: K!, P! [barcode 00600601]). **Figs. 13F, 24A, 30A–D.**

Phegopteris epierioides Fée, *Mém. Foug.*, 5. *Gen. Filic.*:248. 1850–52. TYPE.—CUBA. s.d., *J. J. Linden* “282 or 412” (holotype: P! [barcode 00610891]).

Aspidium araguata Moritz ex Reichardt, *Denkschr. Ak. Wien* 17(2):38, tab. 2, figs. 28–31. 1859. TYPE.—VENEZUELA. Aragua: Colonia Tovar, [10°25'N, 67°16'W], 1844, *J. W. K. Moritz* 202, *pro parte* [mixed with *M. subincisum*] (lectotype, here designated: P! [barcode 610894], P! [barcode 610895]; isolectotypes: F!, GH!, P! [barcode 00600403, 00600404], US [barcode 00067054]).

Rhizomes erect, scales 15.0–22.0 × 0.3–0.5 cm, linear-lanceolate, light brown, lustrous, denticulate; **leaves** 1.0–3.0 m long; **petiole base scales** like those of the rhizomes but more spreading to loosely ascending; **laminae** up to 2 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnisect; **lamina rachises** without hairs abaxially; **basal pinnae** ca. 0.5 m long, inequilateral; **pinna rachises** abaxially eglandular, without hairs, scaly, the scales 1.5–3.0 × 0.1–0.2 mm long, linear-filiform, tortuous, brown, denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, sparsely scaly, the hairs 1.0–1.2 mm long 4–6-celled, the scales like those abaxially; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, sparsely pubescent, sparsely scaly, the hairs 0.3–0.8 mm long, 2–5-celled, acicular, erect to spreading, the scales like those on the pinna rachises abaxially but smaller, 1.5–2.5 × 0.1–0.2 mm, linear to linear-lanceolate, parallel sided, scarcely enlarged basally, adaxially densely pubescent, scales absent, the hairs 0.5–1.0 mm long, 4- or 5-celled, substrigose; **laminar tissue between veins** on both surfaces glabrous; **ultimate veins** visible on both surfaces, abaxially eglandular, sparsely pubescent, scales absent, the hairs ca. 0.3–0.5 mm long, 2- or 3-celled, adaxially eglandular, glabrous to subglabrous; **lamina margins** eglandular, ciliate, the hairs 0.2–0.5 mm long, 2–4-celled, spreading to substrigose; **indusia** absent.

Distribution and ecology.—Cuba, Jamaica, Haiti, Dominican Republic, Puerto Rico, Martinique, St. Vincent, St. Lucia, Dominica, Saba, Trinidad,

northern Venezuela, Colombia; 1200–1860 m in Colombia and Venezuela; in the West Indies, 0–1600 m (Moran *et al.* 2009b).

SELECTED SPECIMENS EXAMINED.—VENEZUELA. **Aragua:** Cordillera interior, faldas que miran al norte, a lo largo del camino entre El Pauji y El Socorro, hacia la represa, al sur de El Consejo, 1350–1400 m, 10°11'N, 67°15'W, 16 Jul 1979, *Steyermark & Stoddard 118183* (GH, VEN). **Distrito Federal:** without locality, [10°35'N, 66°54'W], 1845–1846, *Funcke & Schlim 282* (B, P). **Yaracuy:** Border area between Edo. Lara-Yaracuy, Sierra de Aroa, 10–13 min NW of Urachiche (Edo. Yaracuy) along dirt road leading NW from Urachiche to Duaca (Edo. Lara), 1400 m, 10°14'N, 69°04'W, 16 Nov 1982, *Smith et al. 1342* (MO, UC). 26 Jan 1988, [6°33'N, 75°49'W], *Arbeláez et al. 287* (NY).

COLOMBIA. **Antioquia:** Antioquia, 1500 m, [6°33'N, 75°49'W], 26 Jan 1988, *Arbeláez et al. 287* (NY). **Quindío:** without locality, [4°32'N, 75°40'W], Feb 1852, *Triana 615* (BM). **Tolima:** Mariquita, Combaima, 1200 m, [5°12'N, 74°54'W], Jan 1843, *Linden 1020 p.p.* (B, P).

Megalastrum martinicense is characterized by pinna rachises abaxially without hairs and with dark, tortuous, filiform scales. The scales, at least apically, are usually only 1–3 cells wide. The species greatly resembles *M. subincisum*, which differs by scales of the pinna rachises and costules golden brown, lanceolate to linear-lanceolate, and more than 3 cells wide.

The type number of the synonym *Aspidium araguatum* (Moritz 202) is mixed. Specimens of this number at K and P (P-00600401, P-00600402) represent *M. subincisum*.

22. **Megalastrum microsorum** (Kuntze) Stolze, *Fieldiana, Bot.*, n. s. 27:14. 1991. *Nephrodium microsorum* Hook., *Sp. Fil.* 4:106. 1862. *nom. illeg.*, non Endl. 1833. *Dryopteris microsora* Kuntze, *Revis. Gen Pl.* 2:813. 1891, *nom. nov.* for *Nephrodium microsorum* Hook. *Dryopteris leptosora* C. Chr., *Index Fil.* 274. 1905, *nom. superfl.* for *Nephrodium microsorum* Hook. *Megalastrum leptosorum* (C. Chr.) A. R. Sm. & R. C. Moran, *Amer. Fern J.* 77:128. 1987 [published 3 May 1988]. TYPE.—ECUADOR. [Tungurahua?]: at the foot of Mt. Chimborazo, [1°28'S, 78°49'W] s.d., *R. Spruce s.n.* (lectotype, designated by Tryon and Stolze, 1991: K! [barcode 000200224], photos F!, GH!; isoelectotype: BM! (fragm), [barcode 000921537]). **Figs. 5A, 25A–D, 27B, 28Q–X.**

Rhizomes erect, scales 10.0–20.0 × 0.5–1.0 mm, appressed, linear-lanceolate, gold-brown, flat to tortuous, the margins densely denticulate, the teeth bifid; **leaves** 0.8–1.2 m long; **petiole base scales** like those of the rhizomes but spreading to loosely ascending; **laminae** 0.3–0.6 m long, basally 2-pinnate, medially 1-pinnate-pinnatisect to 2-pinnate; **lamina rachises** pubescent abaxially; **basal pinnae** 10.0–20.0 cm long, equilateral; **pinna rachises** abaxially eglandular, glabrous to densely and evenly puberulent, scaly, the hairs (when present) 0.2–0.5 mm long, 2- or 3-celled, erect to spreading, acicular, hyaline, the scales ca. 3 × ca. 0.1 mm, filiform, brown, tortuous, ascending, lustrous, denticulate, not clathrate, not bullate, adaxially egland-

ular, densely pubescent, without scales, the hairs 0.5–0.8 mm long, 4–6-celled, light brown, ascending, antrorsely strigose, acicular; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, glabrous or sparsely pubescent, scales absent, the hairs (when present) 0.1–0.5 mm long, 1–3-celled, like those of the pinna rachises, adaxially eglandular, glabrous to pubescent, scales absent, the hairs similar to those abaxially; **laminar tissue between veins** abaxially eglandular, glabrous or puberulent, the hairs (when present) 0.1–0.2 mm long, 1- or 2-celled, acicular, erect, hyaline, adaxially eglandular, glabrous; **ultimate veins** on both surfaces visible, eglandular, glabrous; **lamina margins** eglandular, ciliate, the hairs 0.1–0.2 mm long, 1- or 2-celled, acicular, appressed to ascending; **indusia** absent; **spores** cristate.

Distribution.—Ecuador, Peru; humid secondary forests, fog forests; 600–1300(–2800) m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Cotopaxi**: Tenefuerste, Río Pilalo, km 52–53, Quevado, Latacunga, 750–1300 m, [1°02'S, 79°27'W], 7 Feb 1982, *Dodson & Gentry 12280* (MO, QCNE). **Guayas**: Cordillera Chongón-Colonche, Bosque Protector Loma Alta, 600 m, 0°48'S, 80°47'W, 21 Dec 1996, *Cornejo & Bonifaz 5459* (AAU). **Loja**: Vic. of Orianga, 1100 m, 3°52'S, 79°51'W, 5 Mar 1990, *Madsen 86916* (AAU). **Manabi**: Cordillera de Congón, Parque Nacional Machalilla, S of San Sebastian, 500–600 m, [01°35'S, 80°41'W], 24 Mar 1993, *Øllgaard et al. 100773* (QCA).

PERU. **Cajamarca**: Prov. Santa Cruz, ruta Chorro Blanco-Montesecco, 1750 m, [6°51'S, 79°06'W], 21 Jan 1996, *Leiva et al. 1759* (F). **Junín**: Paucartambo, 2800 m, [13°18'S, 71°35'W], 24 July 1961, *Woytkowski 6742* (US).

Megalastrum microsorum is characterized by laminae medially 1-pinnate-pinnatisect to 2-pinnate, basal pinnae equilateral, and pinna rachises with filiform tortuous scales. It is extremely variable as to the pubescence of the laminae abaxially, varying from subglabrous (e.g., *Cornejo & Bonifaz 5459*) to densely and evenly pubescent (type).

Two species greatly resemble *Megalastrum microsorum* in division of the laminae. The first, *M. platylobum*, differs only by basal pinnae inequilateral (i.e., prolonged basiscopically). The second, *M. pleiosoros*, is endemic to the Galapagos Islands. *Megalastrum microsorum* has similar filiform rachis scales as in *M. pleiosoros*, but differs by longer hairs (0.6–1.5 mm) on all parts of the leaf.

23. *Megalastrum miscellum* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.—ECUADOR. Zamora-Chinchiipe: Cantón Zamora, within 3 km of the town of Zamora, 4°03'5"S, 78°57'5"W, 1000 m, 7 Sep 1994, *A. Fay & L. Fay 4382* (holotype: QCNE!; isotypes: AAU!, MO! [barcode 05034342], NY! [barcode 01053912], QCA?-n.v.). **Figs. 22E, 31R–Z, 32A.**

Rhizomes unknown; **leaves** up to 2 m long; **petiole base scales** 15.0–25.0 × 1.0–1.2 mm, spreading to ascending, linear-lanceolate, brown, lustrous,

twisted or flat, sparsely denticulate; **laminae** 0.7–1.2 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect; **lamina rachises** pubescent abaxially; **basal pinnae** 25.0–40.0 cm long, inequilateral; **pinna rachises** abaxially eglandular, pubescent, sparsely scaly, the hairs 0.2–1.1 mm long, 2–6-celled, spreading, the scales $3.0\text{--}5.0 \times 0.3\text{--}0.5$ mm long, loosely ascending to spreading, linear-lanceolate, light brown, entire to sparsely denticulate apically, not clathrate, not bullate, adaxially eglandular, densely pubescent, the hairs 0.2–0.8 mm long, 2–5-celled; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.1–1.1 mm long, 1–6-celled, the scales $0.6\text{--}0.7 \times 0.1\text{--}0.2$ mm, linear-lanceolate, brown, entire, adaxially with hairs like those of the pinna rachises, scales absent; **laminar tissue between veins** abaxially sparsely to moderately glandular, puberulent, the glands ca. 0.1 mm long, sessile, yellowish, spherical, grading into gland-tipped hairs, the hairs ca. 0.1 mm long, 1-celled, appressed to erect, acicular, adaxially sparsely puberulent, the hairs like those on the abaxial surfaces; **ultimate veins** on both surfaces visible, abaxially sparsely glandular and pubescent, the glands spherical, yellowish, intergrading with gland-tipped hairs, the hairs ca. 0.2 mm long, 1- or 2-celled, adaxially sparsely glandular to eglandular, pubescent, the glands spherical, yellowish, the hairs 0.5–1.0 mm long, 4–6-celled, appressed to erect; **lamina margins** eglandular, densely ciliate, the hairs 0.2–0.3 mm long, 3- or 4-celled, ascending; **indusia** minute, fugacious, apparently consisting of a cluster of reddish proscas, ca. 0.1 mm long, protruding from the center of the sorus, not easily observed in mature sori; **spores** cristate.

Distribution.—Colombia, Ecuador, Peru, Bolivia, on both sides of the Andes; 550–2300 m.

SELECTED SPECIMENS EXAMINED.—COLOMBIA. **Antioquia:** Mpio. Caldas, Vereda La Cara, Finca La Oculta, 1950 m, $[6^{\circ}05'N, 75^{\circ}38'W]$, 17 May 1984, *Albert de Escobar et al.* 4476 (NY); Mpio. Salgar, 12 km NE de Salgar, cerca de la finca Regada, costado izquierdo de la quebrada Liboriana, 2200 m, $[5^{\circ}54'N, 75^{\circ}55'W]$, 16 Jan 1988, *Arbeláez et al.* 276 (NY). **Valle:** Ansermanuevo-San José del Palmar rd., ca. 30–37 km W of Ansermanuevo, 1850–1875 m, $[4^{\circ}47'N, 76^{\circ}02'W]$, 13 May 1984, *Luteyn et al.* 10394 (NY).

ECUADOR. **Morona-Santiago:** Morona, near city of Macas, 1100 m, $2^{\circ}20'S, 78^{\circ}08'W$, 7 Nov 1993, *Fay & Fay* 4046 p.p. (AAU, MO, NY, UC). **Zamora-Chinchipe:** Zamora, Parque Nacional Podocarpus, Guarderia en Río Bombuscaro, 970 m, $[03^{\circ}46'S, 78^{\circ}37'W]$, 23 Jan 1995, *Palacios & Tirado* 13214 (MO, QCNE).

PERU. **San Martín:** Mt. Campana, near Tarapoto, $[6^{\circ}27'S, 76^{\circ}24'W]$, Aug 1856, *Spruce* 4718 (P).

BOLIVIA. **Cochabamba:** Prov. Chapare, Parque Nacional Carrasco, cavernas del Repechón, 550 m, $17^{\circ}02'S, 65^{\circ}26'W$, 8 Sep 1996, *Kessler et al.* 8256 (UC). **La Paz:** Prov. Nordyungas, Polo-Polo bei Coroico, 1100 m, $[16^{\circ}10'S, 67^{\circ}43'W]$, Oct or Nov 1912, *Buchtien* 3609 (S). **Santa Cruz:** Manuel M. Caballero, 2200 m, $17^{\circ}47'41''S, 64^{\circ}43'09''W$, 18 Jun 2003, *Núñez & Huaylla* 199 (NY).

Megalastrum miscellum is characterized by pinna rachises and costules abaxially with linear-lanceolate mostly entire scales and hairs of decidedly mixed sizes (thus the specific epithet), lamina tissue between the veins pubescent, and veins adaxially with hairs 0.5–1.0 mm long. *Megalastrum praetermissum* is similar by narrow scales, minutely pubescent abaxial surfaces, and (often) long conspicuous hairs adaxially, but it differs from *M. miscellum* by pinna rachises abaxially without hairs and more strongly denticulate scales.

- 24. *Megalastrum molle*** A. R. Sm., Novon 16:426, fig. 18. 2006, as “*mollis*.”
 TYPE.—PERU. Amazonas: Distr. Bagua, along road from Chiriaco toward Bagua, [5°38'S, 78°32'W], 750 m, 21 Mar 2001, *H. van der Werff, R. Vasquez & B. Gray 16300* (holotype: MO! [barcode 5675669]; isotypes: F! [accession 2251280], NY! [barcode 01093321], UC! [barcode 1777976]). **Figs. 23M–Q, 24B, 29D.**

Rhizomes erect, scales 10.0–15.0 × ca. 0.5 mm, spreading to ascending, linear-lanceolate, brown, lustrous, twisted, subentire to sparsely denticulate; **leaves** 0.5–0.7 m long; **petiole base scales** like those of the rhizomes but smaller, 5.0–10.0 × ca. 0.5 mm, more spreading; **laminae** 25–50 cm long, basally 2-pinnate to 2-pinnate-pinnatifid, medially 1-pinnate-pinnatisect; **lamina rachises** glabrous abaxially; **basal pinnae** 7.0–9.0 cm long, slightly inequilateral; **pinna rachises** abaxially glandular, conspicuously pubescent, sparsely scaly, the glands short-stalked, ca. 0.1 mm long, 2-celled, yellowish, the hairs 1.0–2.0 mm long, 5–7-celled, acicular, spreading, tortuous, whitish, the scales ca. 2.5–3.0 × ca. 0.2 mm, appressed to spreading, linear-lanceolate, brown, lustrous, tortuous, entire to sparsely denticulate, not clathrate, not bullate, adaxially eglandular, densely pilose, scales absent, the hairs similar to those of the pinna rachises abaxially; **basal basiscopic pinnules of medial pinnae** often (especially in large leaves) enlarged and overlapping the lamina rachis; **costules** abaxially sparsely glandular, sparsely pubescent, the glands and hairs similar to those of the pinna rachises, adaxially eglandular, densely to sparsely pilose, scales absent, the hairs similar to those of the pinna rachis adaxially; **laminar tissue between veins** on both surfaces sparsely glandular, the glands ca. 0.1 mm long, stalked, 2-celled, yellowish, abaxially glabrous to sparsely puberulent, the hairs ca. 0.1 mm long, 1-celled, erect, acicular, adaxially sparsely pilose near the lamina margins, the hairs ca. 0.5 mm long, 3- or 4-celled; **ultimate veins** visible on both surfaces, sparsely glandular on both surfaces, the glands similar to those of the lamina tissue, abaxially sparsely pilose, the hairs similar to those of the pinna rachises, adaxially pilose, the hairs 1.0–2.0 mm long, 5–7-celled, whitish; **lamina margins** eglandular, ciliate, the hairs 0.3–1.0 mm long, 2–6-celled, acicular, spreading; **indusia** absent; **spores** cristate.

Distribution and ecology.—Ecuador, Peru; eastern side of Andes, on rocks or trail banks, premontane forest, 200–1200 m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Napo**: Km 86.4 along the road traversing Yasuni National Park, 200–300 m, 0°51'S, 76°16'W, 8 Mar 1998,

Tuomisto & Ruokalainen 11724 (UC). **Zamora-Chinchipe:** immediately N of Zamora, 1000–1200 m, 4°04'S, 78°57'W, 13 Jun 1988, *Ollgaard et al. 74815* (AAU).

PERU. **Cusco:** Quispicanchis, Hills around Río Araza between Pande Azucar and Quince Mil Airport, forest 292 km from Cusco, 643 m, 13°13'S, 70°45'W, 10 Aug 1991, *Nuñez 13973* (MO). **San Martín:** 5–15 km E of Shapaja on road to Chazuta, 200–300 m, 6°36'S, 76°10'W, 9 Apr 1986, *Knapp & Mallet 7022* (MO).

Megalastrum molle is characterized by lamina tissue between the veins on both surfaces glandular, pinna rachises and veins on both surfaces with hairs 1.0–2.0 mm long, 5–7-celled, and lamina margins ciliate by hairs 0.3–1.0 mm long. On the type, which has relatively large leaves, the basal basisopic pinnules are enlarged and overlap the lamina rachis. In the paratypes, the basal basisopic pinnules crowd or slightly overlap the lamina rachis, but they are not enlarged.

Megalastrum molle resembles *M. fibrillosum* by laminae medially 1-pinnate-pinnatisect and pinna rachises with linear-lanceolate scales. It differs by pinna rachises and laminae between the veins abaxially glandular (vs. glabrous) and pinnae rachises conspicuously pubescent with hairs 1.0–1.3 mm long (vs. 0.1–0.2 mm). *Megalastrum bolivianum* is similar by the basal basisopic pinnules often enlarged and laminae adaxially with long hairs, but *M. molle* differs by lamina tissue between the veins abaxially glandular and rachises of the lamina and pinnae with linear-lanceolate, tortuous scales (vs. lanceolate and non-tortuous).

25. *Megalastrum mollicoma* (C. Chr.) A. R. Sm. & R. C. Moran, Amer. Fern J. 77:128. 1987 [published 3 May 1988]. *Dryopteris mollicoma* C. Chr., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd., ser. 8, 6:75. 1920. *Ctenitis mollicoma* (C. Chr.) Ching, Sunyatsenia 5:250. 1940. TYPE.—ECUADOR. Napo: “in silv. suband. orient.,” Oyacachi, Feb 1901, *L. Sodiro s.n.* (lectotype, first-step designated by Tryon and Stolze, (1991) and second step here designated: P! [barcode 00610850]; isolectotypes: BM! [barcode 000907824], photos F!, MICH!, S!; isolectotypes: GH!, P! [barcode 00610849, 00610851], US!). **Figs. 20H–M, 31J–Q, 32B, 33B.**

Megalastrum laxipilosum A. Rojas, Mét. Ecol. Sist. 3(Supl. 1):44, fig. 6A–C. 2008. TYPE.—COLOMBIA. **Nariño:** Reserva Natural La Planada, 7 km above Chuncunés, along road between Tuquerres and Ricauarte, along trail to El Hondón, beginning at Quebrada el Tejón and for 0.5 km beyond, 1°08'N, 77°54'W, 780–800 m, 15 Mar 1990, *T. Croat 71469* (holotype: MO! [barcode 3912989]).

Rhizomes erect, the scales 10.0–30.0 × 0.5–2.0 mm, appressed, lanceolate to linear-lanceolate, brown, entire to sparsely denticulate, flat to twisted; **leaves** 0.5–2.5 m long; **petiole base scales** like those of the rhizomes but spreading to ascending; **laminae** 0.5–1.5 m long, basally 3- to 4-pinnate-pinnatifid, medially 2- to 3-pinnate-pinnatiset; **lamina rachises** pubescent abaxially; **basal**

pinnae up to 30.0 cm long, inequilateral; **pinna rachises** abaxially sparsely to densely glandular, pubescent, scaly, the glands ca. 0.1 mm wide, short-stipitate to sessile and spherical, yellowish to orangish, the hairs 0.2–0.8 mm long, 3–6-celled, lax, spreading, the scales 2.0–7.0 × 0.3–1.0 mm, dark brown to golden brown, lanceolate, flat (not twisted or tortuous), ascending to spreading, firm to thin and, lustrous, entire to sparsely denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, scaly, the hairs 0.6–2.0 mm long, 4–8-celled, spreading to ascending, the scales like those abaxially; **basal basisopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** with indument like that of the pinna rachises but with scales ca. 2.0 × 0.5 mm, adaxially like the pinna rachises but scales absent; **laminar tissue between veins** abaxially pubescent, sparsely glandular, the hairs 0.1–0.2 mm long, 1- or 2-celled, erect, lax to acicular, the glands ca. 0.1 mm long, 2-celled, short-stipitate, yellowish, erect, adaxially pubescent (sometimes only so toward the margins), sparsely glandular, the hairs 0.1–1.0 mm long, 2–8-celled, lax, slightly tortuous, ascending, appressed, the glands like those abaxially; **ultimate veins** on both surfaces visible to obscure, abaxially pubescent, the hairs 0.2–0.6 mm long, 2–5-celled, spreading or appressed-ascending, lax, adaxially the hairs 0.2–0.5 mm long, 2–4-celled, slightly tortuous, spreading to ascending; **lamina margins** eglandular, ciliate, the hairs 0.3–0.8 mm long, 3–6-celled, lax, spreading; **indusia** absent; **spores** cristate.

Distribution.—Colombia, Ecuador; (750–)1800–2450 m.

SELECTED SPECIMENS EXAMINED.—COLOMBIA. **Antioquia:** Mpio. Fredonia, vereda Erbe, microcuenca La Chaparrala, 2150–2250 m, 5°59′01″N, 75°38′28.3″W, 20 Dec 2004, *Rodríguez et al.* 4805 (HUA, NY). **Nariño:** Reserva Natural La Planada, sendero del Rondón, ca. 2 km de centro de investigación, 1900 m, 1°09′55″N, 77°58′44″W, 19 Jan 1997, *Herrera* 9130 (UC); trail to El Hondón, 5–12 km SW of La Planada, 1750–1800 m, 01°04′N, 78°02′W, 6 Jan 1988, *Gentry et al.* 60492 (MO).

ECUADOR. **Carchi:** El Gualtal, faldas de Cerro Golondrina Hembra, 2450 m, 0°51′N, 78°07′W, 21 Aug 1994, *Palacios & Clark* 12644A (MO, QCNE, UC). **Pichincha:** rd from Lloa to the West, Km 20.6, 2450 m, 0°13′S, 78°38′W, 1 May 1991, *Øllgaard* 98891 (AAU). **Tunguragua:** without locality, [0°23′S, 78°25′W], ca. 1857, *Spruce* 5257 (P).

Megalastrum mollicoma is distinctive by the pubescence on the adaxial surface of the laminae: the hairs are dense, slightly tortuous, appressed, and ascending. No other species of *Megalastrum* has pubescence like this. The abaxial surface is also pubescent but the hairs tend to be straighter and more erect. Besides these hairs, also distinctive are the pinna rachis scales conspicuous, shiny brown, and spreading, and the veins adaxially pubescent. The lamina margins are typically fimbriate by lax hairs 0.3–0.8 mm long.

Megalastrum mollicoma might be confused with *M. vastum*, which has similar lamina dissection and is pubescent between the veins on both surfaces. *Megalastrum vastum* differs by hairs between the veins on both surfaces only

0.1(–0.2) mm long, and scales of the lamina and pinna rachises usually dull brown. In *M. vastum* the scales of the lamina and pinna rachises are often inconspicuous to the naked eye, whereas in *M. mollicoma* they are conspicuous.

26. *Megalastrum nanum* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.—BOLIVIA. Santa Cruz: Florida, Cantón Mairana, Parque Nacional Amboró, 7 km NNE by air from Mairana, 18°03'S, 65°55'W, 1900–2100 m, 23 Jul 1994, R. C. Moran 5917 (holotype, LPB!; isotypes, AAU!, NY! [barcode 00870945]). **Figs. 2E, 8A, 32B, 24A–E.**

Rhizomes erect; **leaves** up to 1 m long; **petiole base scales** 10.0–20.0 × 0.5–2.0 mm, linear-lanceolate, spreading to ascending, yellowish brown, twisted, lustrous, the margins denticulate; **laminae** 0.3–0.4 m long, 3-pinnate-pinnatisect basally, 2-pinnate-pinnatisect medially; **lamina rachises** pubescent abaxially; **basal pinnae** 15.0–20.0 cm long, strongly inequilateral (elongated basiscopically), the basal basiscopic pinnule 2.5–4.0 cm wide; **pinna rachises** abaxially densely pilose, sparsely scaly, sparsely glandular, the hairs 1.0–1.5 mm long, 4–7-celled, spreading, the scales light to dark brown, often darker distally, denticulate, the teeth often darker than the body of the scale, especially towards the apex, not clathrate, not bullate, of two sizes, small ones ca. 0.3–0.6 × ca. 0.2 mm long, ovate to lanceolate, mostly appressed, the larger 1.4–2.0 × 0.2–0.3 mm long, linear to linear-lanceolate, spreading, the glands ca. 0.1 mm long, spherical, sessile, orange to yellowish, adaxially with similar indument but with denser hairs; **costules** on both surfaces with indument similar to the pinna rachises; **laminar tissue between veins abaxially** pilose, glandular, the hairs ca. 1.0 mm long, 4–6-celled, spreading to erect, the glands both sessile and stalked, the sessile ones like those on the pinna rachis, the stalked glands ca. 0.2 mm, 2-celled, adaxially glabrous, eglandular; **ultimate veins** visible abaxially, obscure adaxially, abaxially glandular, pilose, the glands sessile, globose, yellowish, the hairs like those on the laminar tissue, adaxially pilose, sparsely glandular, the hairs and glands like those on the abaxial surface; **lamina margins** ciliate, eglandular, the hairs 0.4–1.0 mm long, 4–6-celled, spreading; **indusia** absent; **spores** echinulate.

Distribution.—Ecuador, Peru, Bolivia; 1900–2100 m.

SELECTED SPECIMENS EXAMINED.—ECUADOR. **Zamora-Chinchipec:** New road Loja to Zamora, 13 km E of the Pass, wet forest along creek that crosses the road, 2000 m, 4°00'S, 79°02'W, 14 Feb 1991, Moran & Rohrbach 5380 p.p. (AAU, MO). PERU. **Amazonas:** San Martín, 1950 m, 5°41'S, 77°48'W, 4 Mar 2001, van der Werff et al. 16720 (MO).

BOLIVIA. **Santa Cruz:** Valle Grande, 5 km de Loma Larga a Valle Grande, 2100 m, 18°43'S, 63°54'W, 8 Jun 1996, Kessler et al. 6370 (UC). **Tarija:** Prov. Aniceto Arce Ruíz, Reserva Natural de Flora y Fauna Tariquía, Río Nogal, campamento Alisos, 1700 m, 22°00'S, 64°33'W, 6 Oct 2004, Jiménez & Serrano 2398 (GOET, NY, UC).

Megalastrum nanum is characterized by small leaves (thus the specific epithet), densely pilose pinna rachises abaxially with hairs 1.0–1.5 mm long, 4–7-celled, laminar tissue between the veins abaxially pilose and glandular (both sessile and stalked glands present) but adaxially glabrous, and echinulate spores. The species resembles *M. fugaceum* and *M. pulverulentum* by the scales on the pinna rachises and costules abaxially strongly denticulate and often darkened toward the apex. It further resembles *M. pulverulentum* by petiole base scales 10.0–20.0 mm long (vs. 20–40 mm), laminae with pilose hairs and stipitate and stalked glands abaxially but differs by leaves up to 1 m long (vs. 4 m) and laminar tissue between the veins glabrous adaxially.

Megalastrum nanum superficially resembles *M. ciliatum*, a species that does not belong to the “pulverulentum clade.” The two species are similar by leaf size, cutting, and indument, but there are several differences. First are those characters placing *M. nanum* in the “pulverulentum clade”; that is, the echinulate spores and pinna rachis scales darkened toward the tips (not all scales are darkened apically, but usually several can be found with that character). The two can be distinguished by lamina dissection of the basal basiscopic pinnule of the basal pinna: that of *M. nanum* is 2.5–4.0 cm wide with most of the segments pinnatifid; in contrast, *M. ciliatum* is 1.5–2.0 cm wide with only one or two basal pairs of ultimate segments pinnatifid, the rest being entire. Other differences are the rhizome scales of *M. nanum* that are 0.5–2.0 mm wide and yellowish brown, whereas those of *M. ciliatum* are 0.2–0.5 mm wide and dark brown. The hairs of the pinna rachises abaxially are 1.0–1.5 mm long in *M. nanum* versus 0.3–0.8 mm long in *M. ciliatum*.

27. *Megalastrum nigromarginatum* R. C. Moran, J. Prado & Sundue, *sp. nov.*
 TYPE.—COLOMBIA. Cundinamarca: 8 km NW of Sibate, 19 Oct 1961, R. M. Tryon & A. F. Tryon 6103 (holotype: GH!). **Fig. 22A, 32B, 34M–Q.**

Rhizomes erect, the scales 15.0–25.0 × 0.1–0.2 mm, appressed to strongly ascending, linear, golden brown with margins black-bordered (at least intermittently), flat to twisted, sparsely denticulate; **leaves** 0.8–1.0 m long; **petiole base scales** like those of the rhizomes but loosely spreading to ascending; **laminae** 0.4–0.6 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatifid; **lamina rachises** abaxially glabrous; **basal pinnae** ca. 20 cm long, strongly inequilateral; **pinna rachises** abaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.3–0.5 mm long, 2–4-celled, acicular, spreading, the scales 2.5–4.5 × 0.3–0.5 mm, narrowly lanceolate, brown, flat, subentire to sparsely denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, scales absent, the hairs 0.5–0.8 mm long, 3–5-celled, ascending to spreading, acicular; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, puberulent, sparsely scaly, the hairs 0.2–0.5 mm long, 2–4-celled, acicular, spreading, the scales 1.0–4.5 × 0.1–0.2 mm, linear-lanceolate, brown, lustrous, subentire, adaxially with indument similar to those of the abaxial surfaces; **laminar tissue between veins** abaxially eglandular, densely pubes-

cent, the hairs 0.1–0.2 mm long, 1–3-celled, erect, acicular, adaxially glabrous; **ultimate veins** visible on both surfaces, abaxially eglandular, puberulent, the hairs like those on the lamina tissue, adaxially glabrous or only 1 or 2 hairs present distally, the hairs like those on the costules; **lamina margins** eglandular, ciliate, the hairs 0.1–0.2 mm long, 1–3-celled, ascending to spreading, acicular; **indusia** absent; **spores** cristate.

Distribution.—Colombia; 2000–2700 m.

SPECIMENS EXAMINED.—COLOMBIA. **Cundinamarca**: Cordillera Oriental, 2438 m, 3 Sep 1994, *Little & Little 8597* (GH). **Santander**: between Piedecuesta and Las Vegas, 2000–2500 m, [6°50'N, 73°02'W], 19–24 Dec 1926, *Killip & Smith 15555* (NY).

Megalastrum nigromarginatum is distinctive by its black-bordered rhizome scales (thus the specific epithet). This border is often interrupted, not continuous. Also distinctive are the small laminae (0.4–0.6 m long). The indument is also distinctive. The laminae are pubescent between the veins abaxially by erect acicular hairs. *Killip & Smith 15555* is slightly atypical by more glabrous axes, flaccid scales, and shorter pubescence between the veins abaxially.

This species resembles *Megalastrum ciliatum* from Bolivia and northern Argentina. Both have small laminae and similar cutting, and their rhizome scales are intermittently black-margined—a rare character in the genus. The two species can be distinguished by characters given in the key.

Also similar is *Megalastrum pubescens*, which also has small leaves and is pubescent abaxially between the veins. That species differs by ascending pinnules, laminae abaxially with some of the hairs gland-tipped, and concolorous rhizome scales. Also, its lamina tissue between the veins abaxially has slightly longer hairs (0.2–0.3 vs. 0.1–0.2 mm long) and longer marginal cilia (0.3–0.5 vs. 0.1–0.2 mm long).

28. *Megalastrum obtusum* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.—ECUADOR. Pichincha: Reserva Biológica La Perla, 2 km from La Concordia, [0°0'N, 79°23'W], 400 m, s.d., *H. Ankersen & C. Kragelund 211* (holotype: QCA!; isotype: AAU! 2 sheets). **Figs. 10B,C, 32C, 35A–E.**

Rhizomes erect, scales 5–15 × 0.3–0.5 mm, linear-lanceolate, spreading to ascending, brown to golden brown, lustrous, twisted, denticulate, the teeth simple or sometimes bifid; **leaves** 0.4–1.0 m long; **petiole base scales** like those of the rhizomes but spreading to loosely ascending; **laminae** 0.3–0.6 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatifid, the segments or lobes obtuse; **lamina rachises** pubescent abaxially; **basal pinnae** 6.0–23.0 cm long, strongly inequilateral; **pinna rachises** abaxially eglandular, pubescent, scaly, the hairs (0.5–)0.8–1.5 mm long, 4–7-celled, straightish, spreading, white, the scales 0.5–1.7 × 0.1–0.2 mm, linear, lustrous, brown, subentire to sparsely denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.5–2.0 mm long, 4–7-celled, spreading, straightish, white, the scales like those abaxially; **basal basisopic pinnules** of

medial pinnae not enlarged or overlapping the lamina rachis, obtuse; **costules** abaxially eglandular, sparsely pubescent, sparsely scaly, the hairs like those of the pinna rachises but smaller 0.2–0.5 mm long, 2–4-celled, the scales like those of the pinna rachises but smaller $0.5\text{--}0.8 \times 0.2\text{--}0.3$ mm, adaxially eglandular, sparsely pubescent, the hairs like those on the pinna rachises, without scales, the hairs 0.5–1.0 mm long, 4–6-celled; **laminar tissue between veins** on both surfaces eglandular, glabrous; **ultimate veins** visible on both surfaces, abaxially eglandular, pubescent, the hairs 0.5–1.5 mm long, 2- or 3-celled, spreading, straightish, white, adaxially pubescent, the hairs 0.7–1.0 mm long, 3- or 4-celled, appressed, ascending, straightish, whitish; **lamina margins** eglandular, ciliate, the hairs 0.3–0.5 mm long, 2- or 3-celled, straightish, whitish, ascending; **indusia** absent; **spores** cristate.

Distribution.—Northwestern Ecuador; 250–700 m.

SPECIMENS EXAMINED.—ECUADOR. **Cotopaxi**: Cotopaxi, Río Guapara, ca. 20 km NW El Corazón, 250 m, $[0^{\circ}14'S, 78^{\circ}20'W]$, 19–24 Jun 1967, *Sparre 17168* (MO, QCA, S). **Pichincha**: Reserva Forestal Endesa, along Rio Silanche NE of Pedro Vicente Malonado, 700 m, $00^{\circ}08'N, 79^{\circ}03'W$, 2 Dec 1996, *Øllgaard et al. 2247* (AAU).

Megalastrum obtusum is distinctive by obtuse pinnules and pinna rachises with linear scales and long straightish white hairs. The hairs are also conspicuous on the ultimate veins adaxially. This species has one of the lowest elevation ranges in the genus. Similar by lamina cutting and the presence of long whitish hairs is *M. marginatum*, a species that differs by lanceolate scales on the pinna rachises abaxially and occurrence only in Bolivia. A previous report by Moran & Prado (2010) of *M. longipilosum* A. Rojas from Ecuador was based on two specimens of *M. obtusum*. See note under *M. marginatum*.

29. *Megalastrum oellgaardii* R. C. Moran, J. Prado & Sundue, *sp. nov.* **TYPE**.—ECUADOR. Pichincha: road Pacto-La Delicia-La Esperanza, Km 11, wet forested ravine, $0^{\circ}10'N, 78^{\circ}50'W$, 1600 m, 1 Dec 1996, *B. Øllgaard, H. Navarrete, E. Terneus & V. Quipuscoa 2219* (holotype: AAU! 5 sheets; isotypes: QCA-n.v., QCNE-n.v.). **Figs. 13G, 17E–J, 32A.**

Rhizomes not seen; **leaves** up to 1.5 m long; **petiole base scales** $30.0\text{--}40.0 \times 0.4\text{--}0.6$ mm, spreading to loosely ascending, linear, dark brown, lustrous, twisted and tortuous, strongly denticulate; **laminae** up to 0.6 m long, basally 3-pinnate-pinnatifid, medially 2-pinnate-pinnatifid; **lamina rachises** without hairs abaxially but with many scattered minute scales; **basal pinnae** 40.0–50.0 cm long, strongly inequilateral (elongated basiscopically); **pinna rachises** abaxially eglandular, glabrous, sparsely scaly, the scales $2.0\text{--}3.0 \times 0.2\text{--}0.5$ mm, narrowly lanceolate, spreading, ascending, dark brown, sometimes darker distally, strongly denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.5–1.2 mm long, 4–6-celled, ascending, the scales $3.0\text{--}5.0 \times 0.2\text{--}0.5$ mm, linear-lanceolate, dark brown,

strongly denticulate; **basal basiscopic pinnules of medial pinnae** not enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, glabrous, sparsely scaly, scales like those of pinna rachises but smaller, $0.8\text{--}1.5 \times 0.3\text{--}0.4$ mm, adaxially sparsely pubescent, the hairs like the pinna rachises; **laminar tissue between veins** on both surfaces eglandular, glabrous; **ultimate veins** abaxially visible, eglandular, glabrous, adaxially obscure, glabrous, eglandular; **lamina margins** eglandular, inconspicuously ciliate (often apparently eciliate), the hairs ca. 0.05 mm long, 1-celled, ascending; **indusia** absent; **spores** cristate.

Distribution.—Ecuador; 1600–1750 m.

SPECIMENS EXAMINED.—ECUADOR. **Napo:** road Baeza-Lago Agrio, ca. 114 km from Lago Agrio, 1750 m, $0^{\circ}16'S$, $77^{\circ}46'W$, 8 Aug 1980, *Øllgaard et al.* 35806 (AAU).

Megalastrum oellgaardii is characterized by laminae on both surfaces between the veins glabrous, costular scales dark brown (often more so apically) and strongly denticulate, and lamina margins inconspicuously ciliate, the cilia ca. 0.05 mm long and often apparently absent. It resembles *M. squamosissimum*, a species that differs by pinna rachis scales larger ($2\text{--}10 \times 0.5\text{--}1.5$ mm), sparsely denticulate, golden to pale brown, these often conspicuously spreading on the lamina rachises. Also similar is *M. praetermissum*, which differs by pinna rachises abaxially without hairs and with dark, denticulate, narrow scales, and minute (ca. 0.1 mm long) erect acicular hairs between the veins abaxially. Furthermore, *M. praetermissum* is often pubescent adaxially along the veins.

The specific epithet honors Benjamin Øllgaard, Danish pteridologist who collected the type and who has made many contributions to the knowledge of Ecuadorian ferns and lycophytes.

30. *Megalastrum oreophilum* R. C. Moran, J. Prado & Sundue, *sp. nov.* TYPE.—VENEZUELA. Amazonas: Cerro de Neblina, Río Yatua, S of Camp 3, [$0^{\circ}48'N$, $66^{\circ}02'W$], 1200–1600 m, 24 Dec 1953, *B. Maguire, J. J. Wurdack & G. Bunting* 36871 (holotype: VEN! [barcode 64080, 3 sheets of same number]; isotypes: NY! [barcode 01053916, 01053917], US! [barcode 00798652, 00798653, 00798654, 00798655]). **Figs. 17K–P, 22C, 24C.**

Rhizomes not seen; **leaves** ca. 1.5 m long; **petiole base scales** up to $20.0 \times 0.4\text{--}0.7$ mm, spreading to ascending, linear, lanceolate, golden brown, lustrous, slightly twisted, densely denticulate, the teeth sometimes bifid; **laminae** ca. 1.2 m long, basally 3-pinnate-pinnatisect, medially 2-pinnate-pinnatisect; **lamina rachises** without hairs abaxially; **basal pinnae** 35.0–41.0 cm long, inequilateral; **pinna rachises** abaxially eglandular, densely pubescent, sparsely scaly, the hairs 0.2–0.3 mm long, 2- or 3-celled, acicular, spreading to erect, the scales $2.0\text{--}3.0 \times 0.1\text{--}0.4$ mm, ascending to loosely spreading, linear-lanceolate, golden brown, strongly denticulate, not clathrate, not bullate, adaxially eglandular, densely pubescent, without scales, the hairs 0.4–0.7 mm long, 3- or 4-celled, substrigose; **basal basiscopic pinnules of medial pinnae** not

enlarged or overlapping the lamina rachis; **costules** abaxially eglandular, sparsely pubescent, sparsely scaly, the hairs 0.1–0.4 mm long, 2- or 3-celled, erect, acicular, the scales ca. 1×0.1 mm, linear, denticulate, slightly flexuous, adaxially with indument like the pinna rachises; **laminar tissue between veins** abaxially puberulent, eglandular, the hairs ca. 0.1–0.2 mm long, 1- or 2-celled, erect, acicular, adaxially glabrous or subglabrous with only 1 or 2 hairs near the margins, the hairs ca. 0.1 mm long, acicular, erect; **ultimate veins** visible on both surfaces, abaxially sparsely pubescent, eglandular, the hairs 0.2–0.3 mm long, 2- or 3-celled, acicular, erect, adaxially sparsely pubescent, the hairs like those of the costules; **lamina margins** eglandular, ciliate, the hairs 0.2–0.3 mm long, 2- or 3-celled, substrigose; **indusia** absent; **spores** cristate.

Distribution.—Southern Venezuela, northern Colombia; 1200–2000 m.

SPECIMENS EXAMINED.—COLOMBIA. **Magdalena:** Santa Marta, 2000 m, [$10^{\circ}55'N$, $73^{\circ}38'W$], 1898, *Smith 1023* (BM, F, MO, NY, S, U); idem, 1898–1899, *Smith 1024* (K).

Megalastrum oreophilum is characterized by laminae 2-pinnate-pinnatifid medially, laminae pubescent abaxially with erect acicular hairs and glabrous to subglabrous adaxially (sometimes with a few hairs near the segment margins), and pinna rachis and costule scales linear, yellowish brown, shiny, and denticulate. The species most resembles *M. vastum* but differs by petiole scales golden brown (vs. dark brown) en mass, laminae between the veins adaxially glabrous to subglabrous (vs. puberulent), and pinna rachis scales golden brown and shiny (vs. darker brown and dull). The species is known only from two isolated mountains, thus the specific epithet *oreophilum*.

For figures 19–35, descriptions of species 31–46, Names of Uncertain Application, Unusual Specimens, Acknowledgements, Literature Cited, and Appendices 1–4, see “*Megalastrum* (Dryopteridaceae) in Andean South America, Part II.” *American Fern Journal* 104(4): 109–178.